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Ginna Station

Control Room Emergency Air Treatment System (CREATS) and Emergency Cooling System Design, Fabrication, & Installation Specification

PCR 2000-0024

Rochester Gas and Electric Corporation
89 East Avenue
Rochester, New York 14649

Specification ME-326

Revision 1

Date 7/30/03

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1.0 PURPOSE / SCOPE

This specification defines the technical requirements for the Safety Related design, fabrication, shop testing, documentation, delivery, installation, startup, and field testing of a new Seismic Category I Control Room Emergency Air Treatment System (CREATS) and Emergency Cooling System for the Ginna Nuclear Power Plant. Drawings 33013-3000 and 33013-3001 show the required CREATS and Emergency Cooling System component arrangement. The vendor shall design, furnish, install, and test two 100 % capacity trains, each of which includes the following:

1.1 Ductwork & all dampers, including supports and hangers

1.2 Fans and Motors, complete with:
- Motor
- Flexible connections to ductwork
- Seismic Category I supports
- Power wiring in conduit mounted Seismic Category I

1.3 Filters housing complete with:
- Penetrations, manifolds, & air-tight caps for use in field testing
- Instrumentation & controls
- Instrument & control wiring in conduit mounted Seismic Category I

1.4 Pre-filters and Post-filters including:
- Mounting frames
- Retaining mechanism
- Filters

1.5 Electric heating coils

1.6 HEPA Filter units, including:
- Mounting frame
- Retaining mechanism
- HEPA filter cells

1.7 Carbon Adsorber, including:
- Type III bulk adsorber with 4" deep beds
- Sample canisters
- Fire suppression system
- Carbon filter media
- Carbon handling & sampling equipment

1.8 Cooling System, including:

Indoor DX cooling coils
Rooftop air-cooled condensing units and associated controls
Refrigerant suction & liquid line piping mounted Seismic Category I
Power & control wiring in conduit mounted Seismic Category I

1.9 Work not included:

The entire scope of work bounded by this specification is confined to the Relay Room Annex and it's rooftop cooling system components. The following items to be located within that area will be designed, furnished, installed, and tested by others:

A.) Condensate drain loop seal & piping for both cooling coils.
B.) Breakers, motor starters, and thermal overloads that will be located inside MCCs to be installed in the Relay Room Annex by owner. (Note that section 10.0 describes motor starters and thermal overloads that will not be installed in MCCs; and thus are within the scope of this specification.)
C.) Thermostats, control switches, relays, enclosures, and terminal decks beyond the power and control wiring termination points that are defined in this specification.
D.) Ductwork located above and beyond the ceiling of the Relay Room Annex.

2.0 REFERENCES

2.1 CODES & STANDARDS

2.1.1 ASME AG-1-1997; Code on Nuclear Air and Gas Treatment.

2.1.2 ASME N509-1989; Nuclear Power Plant Air Cleaning Units and Components.

2.1.3 ASME N510-1989; Testing of Nuclear Air Treatment Systems.

2.1.4 USNRC Regulatory Guide 1.29, "Seismic Design Classification."

2.1.5 USNRC Regulatory Guide 1.52, Rev 2, 1978, "Design, Testing, and Maintenance Criteria for Post Accident ESF Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants."

2.1.6 USNRC Regulatory Guide 1.92 "Combining Modal Response and Spatial Components in Seismic Response Analysis, Rev. 1, 1976."

2.1.7 USNRC Regulatory Guide 1.6.1; "Damping Values for Seismic Design of Nuclear Power Plants"

2.1.8 10CFR50 Appendix B, Nuclear Quality Assurance Programs

2.1.9 10CFR21, Reporting of Defects and Noncompliances

2.1.10 ANSI/AWS D1.1, "Structural Welding Code", 1984.

2.1.11 American Iron and Steel Institute; Cold-Formed Steel Design Manual, 1983 Edition.

2.1.12 AISC Steel Construction Manual, 9th Edition.

2.1.13 IEEE 323-1983, "Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations".

2.1.14 IEEE 344-1975 "Seismic Qualification of Class 1E Electric Equipment For Nuclear Power Generating Equipment".

2.1.15 AMCA Publication 201-90; "Fans and Systems"

2.1.16 Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA), for ductwork design and system balancing. SMACNA DCS, HVAC Duct Construction Standards, 1985.

2.1.17 Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA), HVAC Duct Construction Standards, Metal and Flexible.

2.1.18 ANSI / ASHRAE Standard 34-1997; "Designation & Safety Classification of Refrigerants"

2.1.19 ANSI / ASHRAE Standard 15-1994; "Safety Code for Mechanical Refrigeration"

2.1.20 ARI Standard 340/360 "2000 Standard for Commercial and Industrial Unitary Air Conditioning and Heat Pump Equipment".

2.1.21 ASTM D3803-1989; "Standard Test Method for Nuclear-Grade Activated Carbon"

2.2 GINNA STATION ANALYSES, PROGRAMS, & PROCEDURES

2.2.1 DA-NS-98-088; "GOTHIC Thermal Model of the Control Building", Revision 0.

2.2.2 DA-NS-2000-053; "Control Room Toxic Hazards Analysis", Revision 0.

2.2.3 Ginna Station Floor Response Spectra Curves

2.2.4 Ginna QAPSO; "Quality Assurance Program for Station Operation"

2.2.5 A-805 "Control of Consumable Materials at Ginna Station"

2.2.6 A-901; "Control of Welding"

2.2.7 A-1406.1; "Construction, Removal and Control of Scaffolding"

2.2.8 EP-3-P-0140 Modification Design Changes

2.2.9 EP-3-S-0901 Records and Document Control

2.2.10 IP-CAP-1; Abnormal Condition Tracking Initiation or Notification (ACTION) Report

2.2.11 IP-HSC-1; Foreign Material Exclusion

2.2.12 IP-HSC-2; System Cleanness

2.2.13 IP-HSC-3; Housekeeping Control

2.2.14 IP-PRO-6; Procedure Control - Permanent Changes

2.2.15 Ginna Station Design Criteria for PCR 2000-0024, rev. 0.

2.2.16 GC-76.8, rev. 2; "Installation and Inspection of Tubing and Instrumentation/Tubing Supports".

2.2.17 GC-76.9, rev. 1; "Installation and Inspection of Electrical Equipment, Raceway and Electrical Supports".

2.2.18 GC-76.10, rev. 5; "Installation, Testing and Inspection of Wire and Cable".

| 2.2.19 RG&E drawing 33013-3000, rev. 1; "Ginna Station Control Room HVAC - CREATS and Emergency Cooling System Modification P&ID"

| 2.2.20 RG&E drawing 33013-3001, rev. 1; "Ginna Station Control Building - Relay Room Annex - CREATS and Emergency Cooling System Equipment Arrangement"

3.0 DEFINITIONS

3.1 The term "vendor" refers to the company that is awarded the contract and is responsible for the design, fabrication, installation & testing of the new CREATS and Emergency Cooling System at Ginna as described in this specification.

3.2 The term "Owner" shall mean Ginna Station, Rochester Gas & Electric.

3.3 AMCA: Air Movement and Control Association

3.4 ANSI: American National Standards Institute

3.5 ASHRAE: American Society of Heating, Refrigeration and Air Conditioning Engineers.

3.6 ASME: American Society of Mechanical Engineers

3.7 AWS: American Welding Society

3.8 CFR: Code of Federal Regulation

3.9 CREZ: Control Room Emergency Zone; all areas served by the Control Room Emergency Air Treatment System (CREATS), it consists of the Control Room and its adjacent bathroom, kitchen, and Shift Supervisor's office. Boundaries of the CREZ protect Control Room operators from air that could, under certain scenarios, be contaminated by radionuclides or toxins.

3.10 EIN: Equipment Identification Number

3.11 NFPA: National Fire Protection Association

3.12 NRC: Nuclear Regulatory Commission

3.13 OBE: Operating Basis earthquake

3.14 SMACNA: Sheet Metal And Air Conditioning Contractors National Association

3.15 SSE: Safe Shutdown Earthquake

3.16 Standard support: refers to an RG&E standard seismic support design used for tubing or conduit and depicted on drawings that are listed in RG&E procedures, references 2.2.16 & 2.2.17.

4.0 DESIGN REQUIREMENTS

4.1 The function of the CREATS is to satisfy 10CFR50 GDC 19 criteria to provide a protected environment from which operators can control the plant for 30 days after a Design Basis Accident without exceeding dose limits of 30 REM thyroid or 5 REM whole body. The CREATS system also protects Control Room operators from exposure to chlorine or ammonia following an accidental release from sources on or near the Ginna site. The system shall be designed for continuous operation for a minimum period of 30 days in the accident environment. Both 100% capacity trains of CREATS will normally be in secures, in standby, while a separate existing system provides heating, cooling, and ventilation during normal modes of operation.

4.2 Both trains of the CREATS Emergency Cooling System will also normally be secured, in standby. If either CREATS train is actuated then it's associated Emergency Cooling System shall maintain Control Room temperatures conducive to continuous occupancy during any normal or accident conditions.

4.3 The new CREATS system shall be located in the Relay Room Annex, which is not part of the Control Room Emergency Zone (CREZ); thus the pressure boundary of each component (ductwork, fan housing, filter housing, etc) functions as a boundary of the CREZ. Ducts and housing shall be designed and fabricated in accordance with AG-1 sections SA and HA, respectively. Both shall meet the requirements of Leakage Class I described in appendix SA-B of AG-1; leakage criteria are listed elsewhere in this specification for specific components.

4.4 Unless noted otherwise, all new components installed by this modification shall be Safety Related, and shall be Seismic Category I, per section C.1.n of reference 2.1.4. Loads & load combinations are listed in section 12.0, and 10CFR50 Appendix B QA requirements shall be applied.

4.5 In order to limit combustible loading all power and control cables shall be totally enclosed in panels, MCCs, or conduits; open raceway or cable tray routing of wiring is not acceptable.

4.6 The vendor shall be responsible for the design, procurement, fabrication, installation and testing of the CREATS and Emergency Cooling systems in accordance with ASME AG-1 (reference 2.1.1) and, for any equipment not addressed by that code, ANSI N509-1989 (reference 2.1.2). If a conflict arises between these codes and this specification, then this specification shall take precedent. The QA requirements of 10CFR50 Appendix B, and notification requirements of 10CFR21 shall be applied to all aspects of the design, procurement, fabrication, installation, & testing.

4.7 Dimensions for Access:

All components to be installed in the Relay Room Annex may be shipped knocked down for field assembly after being placed inside the room.

The east doorway of the Relay Room Annex opens to the outdoors and measures 34" wide X 83" tall. If needed the owner will remove door casing to provide clearance of 40" wide X 87" tall. Length of components is limited by the landing outside the door, which is 42" wide; if needed the owner will cut the labyrinth wall on the east side of the landing to accommodate lengths up to 12'.

The west doorway of the Relay Room Annex opens to the Relay Room which is, in turn, connected to the Turbine Building. Components entering the Annex via the Relay Room shall not be especially heavy or cumbersome since they will pass by electrical cabinets

containing sensitive equipment that is important to plant safety and/or could trip the plant. Components entering by this path are limited to dimensions of approximately 24" wide X 80" tall X 36" long.

5.0 FAN AND MOTOR

5.1 Fans shall be direct drive centrifugal in accordance with AG-1 section BA-4311. AG-1 section BA-4142.1 leakage criteria applies to the fan housing and to all power or instrument conduits that penetrate the fan housing, in order to prevent leakage of air into or out of the CREATS system. Fan shall be owner approved and shall meet all other AG-1 section BA requirements applicable to centrifugal fans including, but not limited to, vibration (4160 & 5140), bearings (4311.2), driver (4320), accessories (4332), and testing (5000).

5.2 Performance & selection

Each fan shall deliver a minimum 6600 CFM (110% of the nominal 6000 CFM design flow rate) at a peak design pressure to be determined by the vendor. The peak design pressure shall consider the maximum allowable DP across dirty filters (refer to section 6.0), the pressure drop of the rated flow though all components shown on drawing 33013-3001, and the pressure drop through new supply & return ductwork that will be designed and installed by the owner. Fans will be installed at elevation 271' above sea level. Fans shall be selected with the design operating point to the right of the pressure-capacity curve peak in the non-surge region.

Vendor shall furnish a fan performance curve including performance at three conditions: design flow rate, halfway between design and full flow, and halfway between design and zero flow. Data shall be based upon tests conducted of the actual fan, not a fan model, in accordance with AG-1 section BA-5000. Tested configuration of the fans shall most closely represent the ducted inlet and outlet configuration in which the fans will be installed at Ginna. Fan housings or their adjacent ductwork shall have access door(s) that allow inspection of motor and fan without removing the fan from it's installed location.

5.3 Noise:

Fan selection shall strive to achieve sound power levels creating a Room Criteria sound rating less than RC35(N) when coupled with the ducted supply & return installed by the owner above the Control Room's suspended ceiling. Per AG-1 section BA-4217, a fan

sound power report shall be provided and data shall be from a test of the actual fan, not a fan model. Vendor shall provide a test report and, if necessary, calculations showing that the RC35(N) sound rating will be achieved with the installed system.

After installation the vendor shall support sound testing for Room Criteria rating for RC35(N). In the event of unsatisfactory results vendor shall support design and installation of any required dampening or attenuating devices, and such additional work will be treated as an owner-initiated change, per ME-326 section 16.1.4.

5.4 Monitoring:

Thermocouples are not required on bearings. Each fan housing shall include a sealed conduit penetration that will house the wires that allow external, on-line, monitoring of 3 vibration sensors installed on each fan motor. Each motor shall be equipped with an inboard & outboard bearing radial vibration sensor located on the horizontal plane of the motor, plus an axial vibration sensor located on the outboard end of the motor in the load-bearing region. Sensors shall be Wilcoxon Research accelerometers, model 726, 100 mV/G, available from the owner. Sensors shall be installed in accordance with owner's standard and wires for external monitoring shall be securely fastened inside of the fan housing.

5.5 Motor:

Fan motors will be powered by separate trains of Class 1E, 480-volt AC, 3-phase, 60 Hz, diesel-backed vital power. Fan motor shall be able to operate for short term (less than 90 seconds) at 70% of 480 volts ac and long term at 80% of 480 volts ac. Motor shall be owner approved and vendor shall provide locked rotor current, acceleration time for the fan motor to reach its maximum operating speed under 70% of 480 volt ac, and all nameplate ratings (voltage, current, service factor) on motor as part of electrical requirements in document submittal.

5.6 Installation:

5.6.1 Power:

Vendor shall install fans, shall install power wiring inside seismically mounted conduit, and shall make all terminations at the fan and at the motor starters located within the Relay Room Annex. Seismic installation of power shall be in accordance with references 2.2.17 & 2.2.18, shall use Standard Conduit supports (described in reference

2.2.17) wherever possible, and shall consolidate routing of power and control wiring conduits wherever possible in order to minimize the number of supports required. Fan motor breakers, starters, and thermal overload protection will be furnished and installed by the owner in MCCs that will be located in the Relay Room Annex.

5.6.2 Supports:

Fans shall be seismically supported from the roof and/or walls, in the position shown on RG&E drawing 33013-3001. Routing of power and control wiring conduits shall be coordinated and consolidated with equipment supports wherever possible, in order to minimize the number of seismic supports required. Support locations shall not interfere with the clearance(s) required for adjustment of fan blade pitch, vibration monitoring, greasing, and removal/replacement of fans. RG&E shall approve construction drawings and locations of all supports prior to installation.

5.6.3 Connections

Flexible connections shall be provided at the fan outlet and shall meet the requirements of AG-1 section SA-4410. Fans shall have flanged outlet with mating flanged/bolted flexible connections.

5.6.4 Fan housing or adjacent ductwork shall include welded penetrations with FPT connection for vendor-furnished flow switches that measure differential pressure across the fan, as shown on drawing 33013-3000. Flow switch details and tubing requirements are described in section 11.0.

5.6.5 Fan housings or their adjacent ductwork shall have access door(s) that allow inspection of motor and fan without removing the fan from it's installed location.

6.0 FILTERS AND FILTER HOUSING

Flow through each filter housing, and each bank of filters within that housing, shall be 6600 CFM (110% of the nominal 6000 CFM design flow rate). Housing specifications described in subsection 6.1 are applicable to all filters described in section 6.0 of this specification.

6.1 Housings

6.1.1 The filter housing and all access/inspection doors shall be designed and fabricated per the requirements of AG-1 section HA. Inspection windows and interior lighting are not required. Materials for all filter housing pressure boundaries and filter mounting frames

shall be a stainless steel allowed by AG-1 table HA-3100.

6.1.2 The filter housings shall be mounted on steel frames that serve as an integral seismic support and foundation for the filter housings. The steel frames shall be bolted to the existing concrete floor using expansion anchors, and shimmed as necessary to level; no concrete pad or foundation will be provided for the filter housings.

6.1.3 Due to space limitations only the top and one side of each filter housing is appropriate for the installation of access doors, instrument ports, carbon fill & empty ports, fire water & drain connections, etc. Refer to drawing 33013-3001 for arrangement of the components and the space available for access after installation.

6.1.4 Because of overall height of the CREATS system, and the location of equipment above the housing, the top surface of the entire filter housing shall be designed for a personnel live load of 100 Lb/ft^2.

6.1.5 Access & inspection doors

Design of access or inspection doors, frames, & latches shall be in accordance with AG-1 section HA-4420 and Appendix HA-B. Doors weighing over 20 Lbs shall have two handles, and the frame shall have a lip or carriage to support the weight of the door while latches are opened or closed.

6.1.6 Housing Penetrations:

Penetrations shall be welded to the filter housing; use of gasketed bulkhead fittings at the housing is not acceptable. All penetrations <1" shall be FPT "sockolet" type connections; into which tubing adapters can be threaded. Where possible, and with owner approval, the same penetration(s) may serve more than one purpose described within section 6.0 of this specification.

6.1.6.1 Welded penetrations with NPT connections shall be provided in the housing to perform the airflow distribution testing required at initial system startup by AG-1 section TA-IV.

6.1.6.2 Welded penetrations with NPT connections shall be provided for use as upstream injection and downstream sampling points of challenge gas used for periodic in-place testing of HEPA & carbon filter bypass leakage. The location of these penetrations, or installation of internal manifolds, shall ensure successful completion of the air-aerosol mixing test required at initial system startup by AG-1 section TA-V.

6.1.6.3 Welded penetrations with NPT connections shall be provided for vendor-furnished DP gauges, temperature sensors, and flow switches installed in the locations shown on

drawing 33013-3000. Instruments and controls are discussed further in section 11.0.

6.2 Medium efficiency Pre-filters

Medium efficiency pre-filters located upstream of the HEPA filters need not be qualified Safety Related since their only function is to extend HEPA filter's useful life. Filters shall be Class F efficiency (40-49%) or better, and shall meet all requirements of AG-1 section FB-6000. Filter mounting frames shall be stainless steel, and their design shall support the owner's practice of allowing 1" WG DP across these filters prior to replacement; maximum DP across new clean filters shall be <0.5".

6.3 HEPA Filters

HEPA (High Efficiency Particulate Air) filters immediately upstream of the carbon adsorbers shall consist of nominally 24" x 24" x 12" filters, each rated for minimum 1000 SCFM. The number of, and the spacing between, HEPA filters shall be selected to maximize uniformity of the airflow distribution into the downstream carbon filters; end-loaded bag-in-bag-out style filters with a group clamping arrangement are acceptable. Case material shall be type II (14 gage stainless steel) per AG-1 section FC-3110. Gaskets shall be elastomer per AG-1 section FC-4141. Efficiency shall meet or exceed the requirements of AG-1 section FC-5120.

6.3.1 HEPA mounting frame shall be made of stainless steels allowed by table FG-3100 of AG-1. Frame design shall assume a maximum pressure drop of 3" WG prior to HEPA filter replacement.

6.4 Carbon Filters

The activated carbon adsorbers shall be type III, 4" deep, 'bulk' adsorber beds providing a minimum of 0.25 second residence time, calculated per AG-1 Appendix FE-I, when flow rate is 6600 CFM (nominal 6000 CFM + 10% measurement uncertainty). This prescribed depth and residence time creates a nominal face velocity of 80 FPM and a coincident high differential pressure, anticipated to be approximately 8" WG. The adsorber's structural design NOPD shall include the DP at this high velocity, plus a worst-case DP experienced with dirty carbon that is assumed to be at least 150% of the DP experienced with new, clean carbon. Refer to AG-1 section FE-4420 for this NOPD load definition. Fabrication shall be in accordance with AG-1 section FE, and mandatory Appendices FE-II (screen waviness), FE-III (filling qualification), and FE-IV (adsorber qualification).

6.4.1 Vendor shall furnish adsorbent media conforming to the requirements of AG-1 section FF-5221. Media shall be impregnated activated carbon showing < 3.0% penetration of

methyl iodide when tested in accordance with ASTM D3803-1989 (reference 2.1.21) at 30°C (86°F) and 95% RH. Vendor shall provide enough media for initial fill of both trains of carbon filters, plus one refill of both trains.

6.4.2 Vendor shall furnish training for Ginna Station personnel, procedures, and all material handling equipment necessary for loading and for removal of adsorbent from the system. The filling method shall be qualified per AG-1 Appendix FE-III.

6.4.3 The adsorber section shall be equipped with a minimum of ten individual sample canisters or an equivalent method for obtaining representative samples of carbon for laboratory testing; sampling method shall be approved by owner.

6.4.4 Temperature sensors shall be provided to alarm upon high temperature conditions in the carbon adsorber section, refer to section 11.0 for details.

6.4.5 Housings shall include a water deluge fire suppression system installed inside the carbon filter section per AG-1 section FE-4623.4 requirements. Exceptions are that the suppression system and drain piping at the outside of the housing shall not be equipped with valves but shall instead be sealed with an air-tight cap. If suppression system is needed this cap will be removed and a fire hose will be connected to supply the deluge system.

The suppression system piping and nozzles shall be designed assuming that water source at the outside of the housing will provide flow of 150 GPM at 100 PSIg. If necessary to optimize the vendor's suppression system design, the owner will provide more detailed hydraulic calculations for the water source.

6.5 High Efficiency Post-Filters

High efficiency post-filters located downstream of the carbon adsorber shall be minimum 2" deep, disposable type. Their efficiency shall be Class A (> 90%) and they shall meet all requirements of AG-1 section FB. Filter mounting frames shall be stainless steel, and their design shall support the owner's practice of allowing 1" WG DP across these filters prior to replacement; maximum DP across new clean filters shall be <0.5".

7.0 DUCTWORK

Ductwork furnished by the vendor shall be arranged as shown on dwg. 33013-3001; up to and including all ductwork terminating at the ceiling of the Relay Room Annex.

7.1 Leakage class:

All ductwork and fittings shall be Leakage Class I, allowing maximum leakage equal to 0.1 % of rated flow; in this case 6000 CFM corresponds to 6 CFM of leakage (Table B-1310 in Appendix SA-B of AG-1).

7.2 Material & Fabrication

Stainless steel is preferred; all carbon steel surfaces, including welds and cut or sheared edges, shall be galvanized or shall be painted to resist corrosion. Interior of ductwork shall be smooth with no internal protrusions, ledges, discontinuities or obstructions to flow; fabrication processes and tolerances shall be per AG-1 section SA-6000.

7.3 Supports & reinforcements

Ductwork shall be seismically supported, and shall be rigidly braced to be free of vibration and noise. Loads & load combinations for use in ductwork and duct support design are found in section 12.0 of this specification. The type, location and detail of each hanger and support shall be shown on vendor drawings; owner shall approve construction details and locations of all supports prior to installation. Design of ductwork, reinforcements, and supports shall be in accordance with AG-1 section SA-4000 and appendices SA-C and AA-D.

In all modes of CREATS operation, including standby, the ductwork is a boundary of the Control Room Emergency Zone (CREZ) and shall withstand Service Level 'C' load combinations, per AG-1 sections SA-4600 & AA-4214.

7.4 Joints & seams:

Longitudinal seams shall be welded. Transverse joints shall be welded or, where necessary, shall be bolted flange & gasket construction per AG-1 section SA-4300. Flanges shall be joined to the duct by a continuous airtight seal weld at the outside surface of the duct and reinforced with stitch welds at the inside surface of the duct. Connections to, and lengths of ductwork adjacent to, the Emergency Cooling System coils shall be removable, without the need for welding or grinding, to allow access for inspection, repair, or replacement of the coils. The ends of ductwork at the limits of this specification's scope (ceiling of the Relay Room Annex) shall have flanged connections of a size and shape to be determined by owner.

7.4.1 Access & inspection doors

Access or inspection doors installed in ductwork shall be designed in accordance with section 6.1.5 of this specification.

7.5 Insulation:

7.5.1 To avoid condensation on exterior surfaces, vendor shall install insulation on all outside surfaces of the cooling coil housings and the ductwork and fittings that are installed downstream of the coil under the scope of this specification. Preventing condensation is a Non-Safety Related function and use of commercial grade material is acceptable. All materials shall be compatible with components to which they are applied and shall comply with section 16.4.2 of this specification. Seismic II/I evaluation will be required. Insulation shall not be installed on the inside surface of any ductwork.

7.5.2 Insulation shall not be secured by pins welded to ductwork, the method of installing insulation shall be approved by the owner. Insulation shall not be installed on ductwork until after all leakage testing is completed.

7.6 Caps/covers:

Ductwork caps or covers at the suction side of the new CREATS fans, adjacent to dampers AKD32A & AKD32B, shall be removable with handtools and shall meet the required leakage criteria. Exact configuration shall be approved by owner.

8.0 DAMPERS

8.1 The vendor shall furnish and install all new isolation, backdraft, & throttle dampers located in the Relay Room Annex, as shown on drawings 33013-3000 & 33013-3001. This totals twelve dampers:

AKD30A & AKD30B, AKD31A & AKD31B,
AKD32A & AKD32B, AKD33A & AKD33B,
AKD34A & AKD34B, and AKD35A & AKD35B.

New dampers AKD03, AKD21, AKD22, AKD23, & AKD24 shown on drawing 33013-3000 will not be located in the Relay room Annex and thus are not within the scope of this specification).

8.2 Requirements applicable to all dampers

8.2.1 All dampers, including their actuators, shall be Safety Related, shall meet the requirements of AG-1 section DA, and shall be Seismic Category I qualified; loads & load combinations are presented in section 12.0 of this specification. All dampers shall have external "Open" and "Closed" position indications. All damper frames shall be flanged, with gasket, bolts, and companion angle flanges for connection to adjacent ductwork or component.

8.2.2 Vendor shall prepare, and owner shall approve, each damper's design specification detailing all requirements 'A' through 'Z' identified in AG-1 section DA-4110.

8.2.3 Leakage

8.2.3.1 Frame leakage

Damper frame leakage shall be less than Class B requirements of AG-1, Appendix DA-1. Shaft bearings shall be sealed bearings, requiring no periodic lubrication. Seals at the counterweight or actuator end of damper shafts shall be externally replaceable dual seals. Seals at other end of shaft shall be surrounded by a boxed housing seal welded to the damper frame. Boxed housing shall have a minimum 1/4" thick gasketed plexiglass or lexan cover plate mechanically fastened to the housing; the cover encloses the shaft bearing, allows visual inspection, and assures zero leakage. Any exceptions to this specified configuration shall be approved by the owner.

8.2.3.2 All backdraft dampers shall be metal-hinged, single blade, ultra low leakage, having seat leakage rates proven by testing to be less than Class 1 requirements of AG-1, Appendix DA-1.

8.2.4 Access for inspection / repair:

Each damper shall have within it's frame, or in the adjacent ductwork, an access door that allows inspection and repair of seals, seats, blades or other internal parts of the damper. Exceptions are dampers AKD32A & AKD32B, for which the adjacent blind flange provides adequate access.

8.3 Throttle dampers

Section 8.3 applies to throttle dampers AKD32A & AKD32B and AKD33A & AKD33B. All throttle dampers shall be adjusted manually, with linkages configured so that manual adjustment provides discernible position changes with a repeatable effect upon the flow and pressure through the fan. Damper linkages shall have a method of mechanically fixing or securing the throttle damper in the selected position.

8.3.1 Throttle dampers AKD32A & AKD32B shall be capable of limiting the amount of outside air drawn into the CREATS system. Minimum design flow rate through these dampers is 2000 CFM ± 10% when they are fully open.

8.3.2 Throttle dampers AKD33A & AKD33B are intended to create an additional (from the fully open position) 7" WG pressure drop at 6600 CFM (110% of the nominal 6000 CFM design flow rate). These throttle dampers will be used to offset 7" WG of increased filter DP that will occur with time in service, and will be opened as needed during

periodic testing to maintain the required system flowrate.

8.3.2.1 As shown on drawing 33013-3000, rev. 1; AKD33A & AKD33B shall be located upstream of their associated CREATS fan so that decreasing CREATS flow/pressure will decrease the fan motor load and thus decrease the coincident emergency cooling system load. Use of variable inlet vanes at the fan suction venturi is acceptable. If the installed configuration maintains uniform flow of air into the CREATS fan suction then dampers AKD30A & AKD30B or AKD31A & AKD31B may be equipped with adjustable limit stops in order for them to serve the throttle damper function, thus eliminating the need for dampers AKD33A & AKD33B.

8.3.2.2 Damper AKD33A & AKD33B housings, or their adjacent ductwork, shall include ports with air-tight protective caps to allow measurement of DP across the damper at initial system testing.

8.4 Backdraft dampers

Section 8.4 applies to backdraft dampers AKD30A & AKD30B, AKD31A & AKD31B, AKD34A & AKD34B, and AKD35A & AKD35B. All backdraft dampers shall have counterweight arms with adjustable weights, limits stops, quadrants, and locking devices that allow the damper to be secured in the fully closed position for train isolation.

8.4.1 Actuators & End Switches

8.4.1.1 Dampers AKD35A & AKD35B shall be designed & constructed to accommodate actuators which will be furnished by the owner. Vendor shall arrange these dampers and design their seismic supports to accommodate both the damper and the actuator. Actuators are RCS Series Sure 100 spring return electric actuators, weighing 70 lbs. each and providing 1200 in-lbs of torque throughout the 90° rotation.

8.4.1.2 Vendor shall furnish, and install a linkage that connects actuator shafts to damper shafts for AKD35A & AKD35B. Linkage shall be configured so that actuator in the closed position ensures the damper is closed, and actuator in the open position allows the damper to open, but does not necessarily force it to open.

8.4.1.3 Vendor shall furnish and install endswitches on dampers AKD35A & AKD35B to positively indicate damper position, see section 11.0 for details.

8.4.1.4 Vendor shall install actuators and end switches on dampers AKD35A & AKD35B, shall install their wiring inside seismically mounted conduit, and shall make all terminations at these devices and inside of panels that will be furnished and installed by the owner in the Relay Room Annex. Seismic installation of wiring shall be in accordance with references 2.2.17 & 2.2.18, shall use Standard Conduit supports (described in reference 2.2.17)

wherever possible, and shall consolidate routing of power and control wiring conduits wherever possible in order to minimize the number of supports required.

9.0 HEATERS

9.1 Safety Related Heaters in each train of CREATS shall be minimum 25 KW (85,000 BTUh), split amongst a minimum of 3 separate heating elements. Heater capacity in each train shall not exceed 30 KW. Heaters shall meet the requirements of AG-1 section CA-4400.

9.2 Heater Power:

Heaters will be supplied with 480 volt AC, 3 phase, 60-hertz power. Vendor shall install heaters, shall install power wiring inside seismically mounted conduit, and shall make all terminations at the heaters and at the contactors in the MCCs. Heater breakers, contactors, and thermal overload protection will be furnished and installed by the owner in MCCs that will be located in the Relay Room Annex.

Seismic installation of power shall be in accordance with references 2.2.17 & 2.2.18, shall use Standard Conduit supports (described in reference 2.2.17) wherever possible, and shall consolidate routing of power and control wiring conduits wherever possible in order to minimize the number of supports required.

9.3 Heater Controls:

Heaters will have simple on/off control through contactors that must be energized in order to power the heaters; loss of power to the contactor shall de-energize the heaters. The contactor will be controlled by CREATS fan flow switches and by thermostats located inside the Control Room; section 11.0 contains more details on these control devices. Owner will furnish and install the thermostats, all control circuits located beyond the Relay Room Annex, and the contactors located inside the MCCs in the Relay Room Annex.

9.4 Installation:

Heater installation shall be upstream of the carbon filters, in a location having air velocity that exceeds the manufacturer's minimum requirements, and shall allow removal or replacement of heaters without the need for welding or grinding.

10.0 COOLING SYSTEM

10.1 System Configuration & Design requirements:

Cooling systems shall be a split system design with an R-22 direct expansion (DX) coil installed as shown on drawing 33013-3001. Condensing units shall be air cooled and installed on the roof of the Relay Room Annex. The cooling system shall be Safety-Related, Seismic Category 1, meeting the requirements of AG-1 section CA-4200 (DX coil) and applicable portions of AG-1 section RA, "Refrigeration Equipment". None of the equipment installed outdoors by this specification is required to remain intact or operable following a tornado.

If commercial grade equipment is dedicated for use in the Safety Related CREATS Emergency Cooling system, then owner shall review & approve all commercial grade dedication plans and sampling plans for product acceptance. Selection and configuration of cooling system controls will be subject to owner approval based upon proven reliability, ruggedness, future availability for replacement, and simplicity of design. Digital controls will not be accepted and shall not be used.

10.2 Cooling System Performance:

Per reference 2.2.1, the system capacity shall satisfy the room cooling load specified below. This capacity is the control room load requirement and does not include additional coil loads from outside of the control room such as the fan motor, and heat gain through the walls of the ductwork and housing. Vendor shall prepare a calculation of these additional coil loads and size the cooling system accordingly. For coil selection purposes, the room's sensible heat gain factor is greater than 0.95.

nominal airflow, ACFM	6000 CFM
Room temperature	70-74°F
Room Cooling load , Btu/hr (tons)	90,000 (7.5)

AG-1 section RA requires functional testing but does not address DX cooling coils and air cooled condensers. Functional testing and cooling capacity verification of each complete cooling system shall be performed using Standard Rating Conditions from Table 3 of reference 2.1.20; ARI Standard 340/360, "Commercial and Industrial Unitary Air Conditioning and Heat Pump Equipment". DX coil air flow rate during performance of this test shall be the nominal installed system flow rate of 6000 CFM, ± 10%.

10.3 DX Cooling Coil

10.3.1 Coils shall be designed for a flow rate of 6600 CFM (110% of the nominal 6000 CFM design flow rate). To prevent moisture carryover the cooling coil face velocity shall not exceed 500 FPM.

10.3.2 Coils shall include a stainless steel condensate drain pan with NPT connections for installation of loop seal and drain piping by owner. Drain pans shall be sloped toward the drain connection to prevent accumulation of standing water.

10.3.3 Coils shall have refrigerant line and condensate drain pan connections on the accessible end of the coil, away from the wall; refer to drawing 33013-3001 for orientation and access limitations.

10.3.4 The cooling coil shall be completely factory assembled, with flanged airside inlet and outlet connections that are bolted to adjacent ductwork. The cooling coil location and connections to adjacent ductwork shall allow access to the coils for inspection, repair, or replacement of the coils without the need for welding or grinding of ductwork.

10.4 Air Cooled Condensing Unit

Each condensing unit shall include controls, compressor(s), an air-cooled coil, and condenser fan(s) discharging upward.

10.4.1 Air-cooled condenser coil shall have straight and parallel aluminum plate fins oriented perpendicular to the length of copper tubes. Owner shall approve any exceptions; and "spine-finned" coils are not acceptable.

10.4.2 Owner shall approve the location of each air-cooled condensing unit on the roof of the Relay Room Annex, refer to section 10.7.1 for limits on the length (volume) of refrigerant piping between coil and condensing unit.

10.4.3 Vendor will provide and install mechanical equipment stands, penetrations, sleeves, and covers as needed for rooftop condensing units. Installation shall maintain the weather-proof integrity of the roof of the Relay Room Annex, and shall maintain access for future roofing repair or replacement. Configuration is subject to owner approval, acceptable configurations are shown in ARI / SMACNA-B-1997 "Guidelines for "Roof Mounted Outdoor Air-Conditioner installations".

10.4.4 All components exposed to outside weather shall be weather and corrosion-resistant. Casing of the unit shall be galvanized steel with painted exterior, and shall have provisions for rigging.

10.5 Electrical - Power:

Rooftop condensing Units will be supplied with 480 volt AC, 3 phase, 60-hertz power. Each condensing unit will have a single breaker furnished and installed by the owner in MCCs that will be located in the Relay Room Annex. Vendor shall furnish and install the rooftop units, the contactors, the power wiring inside seismically mounted conduit, and shall make all terminations at the rooftop unit, at the contactors, and at the breaker.

10.5.1 Vendor shall furnish and install contactors and thermal overload protection for each compressor and each condenser fan motor in each train of cooling. Loss of power to the contactor shall de-energize the associated rooftop component(s).

If vendor supplies these components inside dedicated panels (as opposed to inside of the weather proof rooftop enclosure of dedicated commercial grade equipment), then these panels shall be installed inside the Relay Room Annex in accordance with references 2.2.17 & 2.2.18. Regardless of their location, vendor shall furnish and install power wiring to, from, and between the contactors and thermal overloads for compressor and condenser fan motors. Control of these contactors shall be provided by the vendor as described in section 10.7.

10.5.2 Seismic installation of power shall be in accordance with references 2.2.17 & 2.2.18, shall use Standard Conduit supports (described in reference 2.2.17) wherever possible, and shall consolidate routing of power and control wiring conduits wherever possible in order to minimize the number of supports required. The entire installation shall prevent interferences and shall allow clearance for service or replacement of all controls, contactors, compressor(s), coils, and fans.

10.6 Electrical - Controls:

If commercial grade equipment is dedicated for use in the Safety Related CREATS Emergency Cooling system, then controls selection and configuration will be subject to owner approval based upon proven reliability, ruggedness, future availability for replacement, and simplicity of design. Digital controls will not be accepted and shall not be used. Vendor shall prepare, and owner shall approve, a sequence of operation that includes the function and response of all CREATS Emergency Cooling system components.

On/off operation of the Emergency Cooling system will be controlled by thermostats located inside the Control Room, by CREATS fan flow switches, and by high and low refrigerant pressure switches. Section 11.0 contains more details on these control devices. Owner will furnish and install thermostats, relays, & all control circuits not

described in this specification.

Electrical controls shall prevent short-cycling of compressor(s).

Refrigerant control options described in section 10.7 may also have an electrical interface requirement.

10.7 Refrigerant circuit controls

10.7.1 Per reference 2.2.2, each train of cooling shall contain less than 29.0 pounds of R-22 OR shall consist of multiple separate R-22 refrigerant circuits such that leakage from any single cooling coil cannot discharge more than 29.0 pounds of R-22 into the Control Room. Vendor shall submit for owner approval a calculation of the total R-22 charge provided in each refrigerant circuit, including the condensing unit, receiver, liquid line, cooling coil, and suction line volumes.

10.7.2 Cooling system shall be capable of operation with ambient outdoor temperatures as low as 0°F. Compressors shall have crankcase heaters, and each DX coil shall have thermostatic expansion valve(s) or equivalent refrigerant control to ensure liquid does not return to the compressor under part load conditions. Automatic pumpdown control shall come from a low pressure cutout switch that will start the compressor regardless of whether the rest of the system is operating. Liquid line solenoid valve(s) shall be interlocked to open only when an evaporator fan is running, and closed whenever the compressor is stopped by any control, safety, or interlock.

10.7.3 Compressor capacity control, if required, is preferred to be via unloaders or multiple compressors. Hot gas bypass is acceptable if it's configuration matches that shown as arrangement 'C' in the ASHRAE Refrigeration handbook chapter 2. If condensing units contain multiple compressors then automatically alternating lead/lag controls shall be provided to equalize the compressors' run time.

10.7.4 Condenser head pressure shall not be controlled by fan cycling unless multiple fans are used and variable speed control or a flow control damper is provided on one condensing fan. Use of condensing air control dampers shall be subject to owner's approval.

10.7.5 Components in each refrigeration circuit shall include the following:

pressure relief devices, as required by reference 2.1.19
liquid and suction line filter driers
Condenser pressure gauge
Evaporator pressure gauge
high & low pressure cutout switches with manual reset
compressor suction and discharge service valves

Liquid receiver, if required, with receiver service valve
liquid sightglass

10.7.6 Pressure relief devices, as required by reference 2.1.19, shall be located outdoors or piped to ensure that refrigerant is discharged outdoors.

10.7.7 Refrigerant suction & liquid lines shall be seismically supported in accordance with reference 2.2.16, shall use Standard supports (described in reference 2.2.16 and 2.2.17) wherever possible, and shall be consolidated with routing of power and control wiring conduits wherever possible in order to minimize the number of supports required.

Suction lines shall be insulated to prevent condensation, and shall be sized or configured to ensure adequate oil return at part load conditions. Installation shall be in accordance with AG-1 section RA-4423 which invokes reference 2.1.19. All compression fittings shall be Swagelok and all joints using filler metal shall be brazed, not soldered (reference 2.1.19, section 9.13.2 exception for A1 refrigerant R-22 shall not apply).

10.8 Spare parts:

10.8.1 IF commercial grade condensing units are provided, THEN one complete condensing unit shall be provided, including compressor(s), coils, and all controls identical to the installed units.

10.8.2 IF condensing units are custom-built with individually specified components THEN the vendor shall supply spare compressors in quantity equal to the total number of compressors found in one condensing unit.

11.0 INSTRUMENTS & CONTROLS

Vendor shall furnish and install the specified instruments & controls, necessary tubing, and attendant wiring in conduit. Most of the devices discussed in this section are depicted on RG&E drawing 33013-3000; (reference 2.2.19).

Vendor shall make all terminations at vendor-installed devices and, for vendor-installed devices that require interface with owner-installed circuits, inside of panels installed by the owner in the Relay Room Annex.

All tubing, wiring, components, and conduit shall be installed Seismic Class I using references 2.2.16 & 2.2.17 as applicable, shall use Standard supports (described in references 2.2.16 & 2.2.17) wherever possible, and shall consolidate routing of all conduits and tubing wherever possible in order to minimize the number of separate supports required. Wiring shall be installed using reference 2.2.18. Installation shall

maintain access to all locations needed for adjustment, removal, or replacement of the devices. Tubing shall be installed in compliance with AG-1 sections IA-4320, IA-4550, and IA-4800.

11.1 Air side instruments:

Housing penetrations for air side instruments are specified in section 6.1.6.

11.1.1 Gauges shall be provided for local indication, in inches of water gage (" WG), of the differential pressure across the four filter sections in each train of CREATS. Accuracy shall be ± 2% of full scale. Minimum (new, clean) and maximum (dirty) filter DPs described in section 6.0 shall indicate within the middle 90% of the range. Range shall be not more than 3 times the applicable maximum (dirty) filter DP presented in section 6.0. System penetrations for these gauges are specified in section 6.1.6.

11.1.2 A switch with two form "C" contacts, rated for 120VAC / 125 V DC, shall sense differential pressure across each CREATS fan. This flow switch will trigger a low flow alarm and provide a permissive interlock for energizing the heaters and for energizing the cooling system. Flow switch pressure rating shall exceed the shutoff head, "no flow" discharge pressure of the CREATS fan. System penetrations for these switches are specified in section 6.16.

11.1.3 Sensing lines for air side DP gauges and switches shall be stainless steel, with stainless steel swagelok fittings. High and low pressure sensing lines at each device shall include a capped branch connection fitting to allow on-line calibration of the device.

11.1.4 High temperature switches, rated for 120V AC / 125 V DC, shall be provided upstream and downstream of the carbon filters, per AG-1 section FE-4621.

11.1.4.1 High temperature switches shall be accessible for trip testing using a heat gun; acceptable access is from inside the filter housing via access doors, or via removal of the detector from the filter housing, without the need for de-terminating wires.

11.1.5 Local temperature indicators shall have minimum 24" long capillary "averaging" sensors to mask the effects of temperature stratification or streaming. Sensors shall be wrapped around and between two or more separate, round, rods welded to the inside of the ductwork.

11.2 Vendor shall furnish & install the Emergency Cooling systems' instruments and controls as described in section 10.5, 10.6, and 10.7. On/off operation of the Emergency Cooling system will be controlled by thermostats located inside the Control Room, with permissive functions from CREATS fan flow switches and from high and low refrigerant pressure switches.

11.2.1 Each refrigeration circuit shall be equipped with high & low refrigerant pressure switches having form "C" contacts rated for 120V AC / 125 V DC. These switches shall trigger an alarm in the main control room and provide a lockout feature that trips the associated Emergency Cooling system.

High and low pressure switches shall require manual reset.

The low pressure alarm switch shall be a device separate from the low pressure cutout switch used to control pumpdown cycle, and shall be capable of providing the alarm function at all times, in order to indicate a potential refrigerant leak and inoperability of the equipment.

11.2.2 Electrical controls shall be provided to prevent short-cycling of compressor(s).

11.3 Owner-approved endswitches shall be mounted on dampers AKD35A & AKD35B to positively indicate damper position.

11.4 Owner will furnish and install the thermostats, relays, and wiring that are located outside of the Relay Room Annex and control the heating & cooling functions.

Owner will furnish & install, in the Relay Room Annex, the contactors controlling 480V power supplied to the heaters as described in sections 9.0.

Vendor shall furnish & install the cooling systems' internal controls as described in sections 105, 10.6, & 10.7.

12.0 LOADS & LOAD COMBINATIONS

12.1 All equipment installed in the Relay Room Annex shall be Safety Related and Seismic Category I, per RG 1.29 section C.1.n. 10CFR50 Appendix B QA requirements shall be applied to their design, fabrication, installation, and testing. New components (fans, ductwork, dampers, & supports) installed by this modification shall be designed for the loads and load combinations listed below.

12.2 Standard RG&E seismic supports described in references 2.2.16 & 2.2.17 shall be utilized wherever possible. If custom supports are required, they shall be designed in accordance with section 12.4.

12.3 The spectra to be used in the analysis of all equipment is presented in reference 2.2.3; damping values listed below are extracted from reference 2.1.7.

	OBE	SSE

Equipment	2	3
Welded Steel Structures	2	4
Bolted Steel Structures	4	7

12.4 STRUCTURAL LOAD CRITERIA

The Structural load criteria are extracted from Attachment A of the Design Criteria, reference 2.2.15.

12.4.1 Dead Load - D

Dead loads will include the weight of the structure, the weight of permanently supported equipment (such as filters, fans, dampers, electrical cabinets, etc., as shown on the equipment vendor's drawings) and system components (such as piping, cable trays, conduit and ductwork). Dead loads are determined from construction drawings and based on field inspections conducted earlier in the program. The service loads will be included in the dead load. (Service load is the dead load of all equipment, i.e., filters, fans, dampers, piping, conduit, switchgear, etc., that is permanently in place on the structure).

12.4.2 Live Load - L

Uniform live loads are 300 Lb/Fft^2 on the floor of the Relay Room Annex, and 400 Lb/Fft^2 on the roof of the Relay Room Annex. All floors will be equal to these uniform live loads for normal and severe load cases. Twenty five (25) percent of these uniform live loads will be used for the live load when considering extreme load cases.

12.4.3 Lateral Earth Pressure - H

The pressure exerted by the soil on the various structures. Not applicable to any of the scope of work described in specification ME-326.

12.4.4 Buoyant Force - F[1]

The buoyant force of the design basis flood. Not applicable to any of the scope of work described in specification ME-326.

12.4.5 Thermal Loads - T_o

Thermal loads from piping systems during normal operating or shutdown conditions, based on the most critical transient or steady state condition, are assumed to be equal to 2.5% of dead loads and are included in the overall dead load.

12.4.6 Pipe Reactions - R_o

Pipe reactions during normal operating or shutdown conditions based on the most critical transient or steady state condition are assumed to be equal to 2.5% of the dead loads and are included in the overall dead load.

12.4.7 Normal Wind Loads - W_n

Wind loads will be based upon the requirements of ANSI A58.1-1982. The design will be based on a 100 year wind of 75 mph at a height 30' above the ground.

12.4.8 Normal Snow Loads - S_n

Snow loads will be based upon the requirements of ANSI A58.1-1982. The design ground snow load shall be 40 psf. Drifting shall be considered.

12.4.9 Extreme Snow Load - S_n'

The extreme snow load specified for Ginna Station is based on the 48-hour maximum winter precipitation, equivalent to 50 psf added to the 100-year recurrence accumulated ground snow pack of 50 psf, resulting in a total roof load of 100 psf. Drifting will not be considered in this extreme load case.

12.4.10 Operating Basis Earthquake (OBE) - E

Loads due to an OBE will be based on a maximum ground acceleration of 0.08g.

12.4.11 Safe Shutdown Earthquake (SSE) - E'

Loads due to an SSE will be based on a maximum ground acceleration of 0.20g.

12.5 Structural Load Combinations and Acceptance Criteria

The following load combinations and acceptance criteria will be considered in evaluating any modifications. These criteria were approved by the NRC as part of Phase 1 of the Structural Upgrade Program.

12.5.1 Load Combinations For Structural Steel

	Load Case	Acceptance Criteria
1.	$D + L + S_n$	1.0S (see Note 1)
2.	$D + L + E$	1.0S
3.	$D + L + S_n + E$	1.5S
4.	$D + L + S_n + E'$	1.6S
5.	$D + L + S'_n$	1.6S

12.5.2 Load Combinations For Reinforced Concrete

	Load Case	Acceptance Criteria
1.	$1.4D + 1.7L + 1.7S_n$	U (see Note 2)
2.	$1.4D + 1.7L + 1.9E$	U
3.	$D + L + S_n + E$	U
4.	$D + L + S_n + E'$	U
5.	$D + L + S'_n$	U

12.5.3 Load Combinations for Foundation Stability

Load Case	Acceptance Criteria Minimum Factors of Safety		
	Overturning	Sliding	Flotation
1. D + H + E	1.5	1.5	—
2. D + H + E'	1.1	1.1	—
3. D + F'	---	—	1.1

NOTES:

1. S = the allowable steel stress as defined by the AISC Manual
2. U = the required concrete strength to resist factored loads, as defined by ACI 349-85
3. When any load reduces the effect of other loads, the corresponding coefficient for that load shall be 0.9 if the load is always present or occurs simultaneously with the other load. Otherwise, the coefficient shall be zero.

12.6 LOAD COMBINATIONS AND STRESS LIMITS FOR PIPING & DUCT SUPPORTS

New damper and duct support seismic loads shall be determined following the piping system analysis methodology in section 12.7. New duct stresses shall be evaluated using methods presented in the American Iron and Steel Institute (AISI) "Cold-Formed Steel Design Manual" as defined in AG-1. Duct stresses shall meet the acceptance criteria in ASME AG-1. Duct support stresses shall be evaluated using AISC Steel Construction Manual 9th edition.

12.6.1 Refrigerant piping and piping supports shall be designed for the loads listed below and for the combination and acceptance criteria specified in section 12.7.

12.6.2 Loads:

	Loading Combination	Stress Limits
Normal:	D or (5) D + F + T	≤ Working Stress (1)
Upset:	D ± E or (5) D + F + T ± E	≤ Working Stress (1)
Faulted:	D ± E' or (5) D + F + T_o ± E'	≤ Faulted Stress (2)

Deadweight and thermal are combined algebraically

D = Deadweight
T = Maximum operating thermal condition for system
F = Friction Load (3)
E = OBE (Inertia load + seismic differential support movement)
E' = SSE (Inertia load + seismic differential support movement)
T_o = Thermal - Operating Temperature

(1) Working stress allowable per Appendix XVII of ASME III.
(2) Faulted stress allowable per Appendix XVII, Subsection N, and Appendix F of ASME III and USNRC Regulatory Guide 1.124. Safety Class 1 supports will be evaluated and designed in accordance with Regulatory Guide 1.124.
(3) Whenever the thermal movement of the pipe causes the pipe to slide over any member of a support, friction shall be considered. The applied friction force applied to the support is lesser of μ W or the force generated by displacing the support an amount equal to the pipe displacement.
μ = .35
W =Normal load (excluding seismic) applied to the member on which the pipe slides.
(4) Expansive anchorages shall meet the requirements of NRC IE Bulletin 79-02.
(5) For each loading condition, the greater of the two load combinations shall be used. Component Standard Supports (New and Existing)

For a majority of the component standard supports, the loads given on the certified load

capacity data sheets (LCD's), shall serve as the maximum allowable loads for the given condition.

U Bolt allowable loads will be based on finite element analyses using the criteria for bolts given in ASME Code Case 1644-4.

Rod hangers are generally single acting vertical supports, in the upward direction they are susceptible to an early buckling condition. Capacities therefore, in the upward direction are minimal. Consideration of this condition will be made within the evaluations of hangers. Capacities in the downward direction will continue to be obtained from applicable load capacity data sheets.

For component standard supports which do not have certified LCDS, the catalog allowable load at the time of manufacture will be prorated for the various loading conditions by the same factor used for the same component with a LCDS. The prorated load shall serve as the maximum load for the given loading condition.

Supports Fabricated from Non Catalog Items

The stress limits for supports fabricated from non-catalog items shall be based on allowable stresses from ASME III, ANSI or ASTM material used. If the material is not known, it is assumed to be A-36 carbon steel.

12.7 LOADING COMBINATIONS AND STRESS LIMITS FOR PIPING

	Loading Combinations	Stress Limits
1. Deadweight:	Design Pressure + Deadweight	$P_m \leq S_h$ $P_L + P_B \leq S_h$
2. OBE Seismic:	Design Pressure + Deadweight + Design Earthquake Loads (OBE)	$P_m \leq 1.2\ S_h$ $P_L + P_B \leq 1.2\ S_h$
3. SSE:	Operating Pressure + Deadweight + Maximum Potential Earthquake Loads (SSE)	$P_m \leq 1.8\ S_h$ $P_L + P_B \leq 1.8\ S_h$
4. Thermal:	A. Maximum Operating Thermal + OBE Displacements	$SE \leq S_A$
	B. Design Pressure + Deadweight + Maximum Operating + OBE Displacements	$P_L + P_B \leq S_h + S_A)$

Where:

P_m = primary general membrane stress; or stress intensity

P_L = primary local membrane stress; or stress intensity

P_B = primary bending stress; or stress intensity

S_S, S_h = allowable stress from USAS B31.1 Code for pressure piping

S_E = thermal expansion stress from USAS B31.1 Code for pressure piping

13.0 ENVIRONMENTAL REQUIREMENTS

13.1 Control Room

Normal operation:	Temperature	50°F to 104°F (usually 70-78°F)
	Pressure	0 psig
	Humidity	60% (nominal)
	Radiation	Negligible
Accident Conditions:	Temperature	70°F to 74°F
	Pressure	0 psig
	Humidity	60% (nominal)
	Radiation	Negligible
	Flooding	Not applicable

13.2 Relay Room & Relay Room Annex

Normal operation:	Temperature	50°F to 104°F
	Pressure	0 psig
	Humidity	60% (nominal)
	Radiation	Negligible
Accident Conditions:	Temperature	< 104°F
	Pressure	0 psig
	Humidity	60% (nominal)
	Radiation	Negligible
	Flooding	Not applicable

13.3 Control Building Air Handling Room

Normal operation:	Temperature	50°0F to 104°F
	Pressure	0 psig
	Humidity	60% (nominal)
	Radiation	Negligible
Accident Conditions:	Temperature	< 104°F
	Pressure	0 psig
	Humidity	60% (nominal)
	Radiation	Negligible
	Flooding	3' depth of water (SW line leak)

13.4 **Outdoor environmental conditions:**

Normal Operation:	Winter Temperature	1°F
	Summer Temperature	89°FDB & 73°FWB, 93FDB max.
	Pressure	0 psig
	Radiation	negligible

None of the equipment installed outdoors under the scope of this specification is required to remain intact or operable following a tornado.

14.0 INSPECTION, EXAMINATION, AND TESTING

All testing shall be performed per the requirements of AG-1 section TA-6000 (QA) and the applicable test procedure. Unless indicated otherwise, the test/inspection is to be performed by the vendor and all testing required by AG-1 shall be performed.

14.1 PRE-SHIPMENT TESTS / INSPECTIONS:

The following shall be completed, documented, and shall be received by the owner two (2) weeks prior to, scheduled shipment of the affected component to Ginna Station.

14.1.1 Owner shall perform visual inspection of all dampers, filter housings, filter mounting frames, and adsorber banks (per AG-1 section FE-4300 and Appendices TA-1, FE-II , and FE-A) prior to shipment from the shop in which they are fabricated.

14.1.2 Fan rating test, including performance curve of all available blade pitch positions, with data based upon tests conducted of the actual fan, not a fan model, in accordance with AG-1 sections BA-5000 (testing) and BA-4412 (documentation).

14.1.3 A summary calculation of the system's total pressure loss at rated flow, including any system effects described in sections 7 through 10 of reference 2.1.15. The summary calculation shall include system response curves for each train, plotted alongside the fan performance curve.

14.1.4 Sound rating of the system per section 5.3 of this specification and AG-1 section BA-5000.

14.1.5 Functional testing and cooling capacity verification of each complete cooling system, per section 10.2 of this specification.

14.1.6 Damper frame and seat leakage tests per AG-1 section DA-5000.

14.1.7 Laboratory test of carbon adsorber media in accordance with ASTM D3803-1989 (reference 2.1.21). Test temperature shall be 30°C (86°F), RH shall be 95%, 1.75 mg/m^3 tagged $CH_3{}^{131}I$, velocity equal to design velocity of the adsorber, 1 atmospheric pressure. Acceptable methyl iodide penetration is < 14.5%.

14.1.8 Test of each condensing unit's internal controls, pressure switches, resets, safeties, interlocks, and lockouts specified in section 10.4. These tests shall comply with section IA-5000 of AG-1.

14.2 TESTS & INSPECTIONS DURING INSTALLATION:

Tests and inspections performed during installation shall be in accordance with AG-1 section AA, and shall be included as necessary in the Work Instructions described in section 16.1 of this specification.

14.3 FIELD ACCEPTANCE TESTS / INSPECTIONS:

The following field acceptance tests, as a minimum, shall be performed in accordance with QA requirements of AG-1 section TA-6000 (Personnel, procedures, & documentation). Unless indicated otherwise; all tests shall be performed by the vendor and shall be witnessed by the owner. These tests shall begin only after all pressure boundary components have been installed, prior to installing ductwork insulation, and shall be performed as directed by the Work Instructions described in section 16.1.

14.3.1 Field acceptance visual inspection, structural capability, and leakage testing shall be performed in accordance with AG-1 Mandatory Appendices TA-I through TA-III; mounting frame pressure leak test per Appendix TA-A is not required. Leakage testing shall include test of the entire volume of owner installed ductwork that connects the new CREATS to the Control room. Per section 1.9, the vendor has no responsibility for leakage in ductwork located above and beyond the ceiling of the Relay Room Annex.

14.3.2 Suppression system flow test (air or inert gas is an acceptable test medium) to prove installed piping and nozzles are unobstructed.

14.3.3 Tests described in this section require all filters to be installed, including the carbon media. If not previously performed then tests shall be performed per AG-1 Appendices FE-III (adsorber filling qualification), and FE-IV (adsorber qualification).

14.3.3.1 Owner shall measure total fan flow rate and, with vendor support, set the position of fan blades and of throttle dampers AKD33a & AKD33B. Pitch of the fan blades shall be set in a position that provides the rated system flow (6000 CFM ± 10%) with a minimum of 7" WG pressure drop across the associated throttle damper AKD33A & AKD33B; refer to section 8.3.2 for throttle damper details.

14.3.3.2 After rated flow is established through the system and proper throttle damper DP is verified, DP across the fan shall be measured. This value will help establish the proper setpoint for CREATS fan flow switches; typically 50% of this DP measure at normal flow and lowest filter DP.

14.3.3.3 Owner shall measure flow rate through fully open throttle dampers AKD32A & AKD32B, to verify minimum 2000 CFM, per section 8.3.1 requirements.

14.3.3.4 Field acceptance distribution, mixing, filter bypass, and refrigerant system leak testing shall be performed in accordance with AG-1 Mandatory Appendices TA-IV through TA-VIII. Refrigerant system leak testing shall be performed at the design pressures determined using section 9.2 of reference 2.1.19.

14.3.3.5 Heater capacity test, via measurement of electrical power consumption by the heaters.

14.3.3.6 Owner will perform cooling system capacity test, per owner's procedure.

14.3.3.7 Owner will perform and document the integrated system testing defined in AG-1 section TA-4900 (damper position changes, fan starts/stops, control switches, interlocks, mode changes, alarms, etc.) This includes testing of Emergency cooling system design features defined in the vendor-supplied sequence of operation, described in section 10.6.

14.3.3.8 Owner will perform sound test to verify section 5.3 noise requirements are met.

15.0 MARKING, PACKAGING, STORAGE, & HANDLING

15.1 Identification and Marking:

The following major components shall be identified with a nameplate in accordance with the AA-9000 and other sections of AG-1 applicable to the component. Listed below are the component description (within quotation marks) and the Owner's Equipment Identification Numbers (EIN) that shall be included on these nameplates. The EINs are also found on drawing 33013-3000.

15.1.1 "CREATS Fan" EINs are: AKF10A & AKF10B.

15.1.2 "CREATS Filter Housing" EINs are: AKP06A & AKP06B.

15.1.3 "Electric heater" EINs are: AKA05A & AKA05B.

15.1.4 "CREATS Emergency Cooling coil" EINs are: AKA06A & AKA06B.

15.1.5 "CREATS Emergency Cooling Condensing unit" EINs are: AKP07A & AKP07B.

15.1.6 "CREATS Damper" EINs (twelve of them) are:

AKD30A & AKD30B,	AKD31A & AKD31B,	AKD32A & AKD32B,
AKD33A & AKD33B,	AKD34A & AKD34B,	AKD35A & AKD35B

15.2 Packaging, shipping, receiving, storage, & handling requirements shall be in accordance with AG-1.

16.0 INSTALLATION REQUIREMENTS

This section specifies requirements for installation of the new systems at Ginna; the final configuration of equipment systems and functions shall be as described on the owner approved design outputs and design changes (MDCNs). Vendor work scope must adhere to procedure steps and remain within the boundaries of Owner approved construction documents, as described in section 16.1

16.1 Work Instructions

16.1.1 All changes to, attachments to, installation, or testing of plant systems, structures or components, whether permanent or temporary, shall be performed in accordance with one or more of the following:

A) latest revision of a drawing or procedure that is issued by the owner with the status "released for construction".
B) an approved Procedure Change Notice (PCN; reference 2.2.14)
C) an approved Modification Design Change Notice (MDCN; reference 2.2.8)

16.1.2 Detailed Work Instructions for installation and testing will be in the form of a Station Modification (SM) procedure prepared and issued by the owner, with input from the vendor. Additional prerequisites, precautions, and interface requirements may be included in a Ginna Station Work Order in which the SM procedure resides; these requirements shall also be satisfied. A copy of the SM marked "Master Copy" shall be at the work site; all other copies are considered "informational" and shall be so marked on the coversheet.

16.1.3 Work Instructions submitted by the Vendor will be approved by the Owner and included in the SM procedure or, in the case of a vendor's procedure, the specific title & revision of the procedure will be referenced in the SM procedure.

16.1.4 Any required changes to installation procedures or drawings will be incorporated using a PCN or MDCN (reference 2.2.14 or 2.2.8) that shall be approved by the owner. Changes to a vendor's procedure or drawing are not valid at Ginna until and unless they are implemented by an owner's PCN or MDCN.

16.1.4.1 Vendor's entire scope of work is performed under a fixed-price contract; thus vendor-initiated MDCNs shall have no cost consequence for the owner. Additional vendor costs, if any result from an owner-initiated change, shall be paid by the owner based upon a fixed price estimate prepared by the vendor on a time & materials basis. The cost change need not be approved prior to performing the work if such delay will effect the scheduled end date.

16.1.4.2 Any changes or deviations made by the owner to an owner-generated document will be submitted to the vendor by document revision or other written notice.

16.1.4.3 For closure of MDCNs the vendor shall perform, and shall transmit to owner, any

and all revisions to vendor-generated drawings, design analyses, or any other design basis documents that may be required as a result of the MDCN.

16.1.5 Foreman shall conduct a pre-job brief at least once at the start of each shift, and more often as needed due to changes in work scope, conditions, or hazards. The pre-job brief shall provide further work instruction based upon the foreman's review of upcoming SM procedure steps. The brief is intended to familiarize all personnel with the purpose, sequence, required action and interaction, precautions, consequences, mitigating actions, and required inspection & documentation.

16.1.6 Nonconforming items and conditions adverse to quality identified during installation phase of the project shall be documented using the Ginna ACTION Report process (Reference 2.2.10). All ACTION reports shall be submitted to owner for processing.

16.2 Personnel

16.2.1 Owner's Project Manager:

The owner will provide a Project Manager who is knowledgeable in the engineering requirements, the scope of work, and the organization & procedures at Ginna. The Project Manager's responsibilities include, but are not limited to:

A) Arrangement of review, approval, and issue of documents "released for construction" and maintain the distribution list for recipients of controlled copies.
B) Coordination with Ginna's Scheduling, Maintenance, Operations and other work groups to obtain support services, authorizations, and permits.
C) Process MDCNs and PCNs as needed to support any changes required during installation & testing.

16.2.2 Vendor's Construction Manager

Throughout the installation & testing the vendor shall provide a Construction Manager to serve as the primary contact for the owner's Project Manager.

16.2.2.1 Construction Manager is responsible for adherence to the installation and testing requirements of this specification, and shall coordinate the work of the trades listed in section 16.2.3. The Construction Manager's primary concerns, in descending order of priority, shall be safety, quality, and schedule.

16.2.3 Vendor shall provide all personnel, labor, and tools necessary to perform installation, startup, & testing of the CREATS and Emergency cooling systems including, but not limited to, the following skills or trades:

Riggers
Welders
Sheet metal fabricators
Roofers
Licensed refrigerant handlers

Electricians
Instrument & Control technicians
Quality Control Inspection, subject to owner's option described in section 17.6.
Testers qualified per the requirements described in section 14.0.

16.2.3.1 Each skill or trade shall have an assigned foreman or other supervisor to be responsible for the crew, for the work produced, and for compliance with the procedure(s) directing that trade's work. The foreman's primary concerns, in descending order of priority, shall be safety, quality, and schedule.

16.2.3.2 All work groups will have personnel with the skills required for the task. Vendor will certify the skills or special process as required by code, by common practice, or by Owner request.

16.2.4 Prior to the start of work vendor shall submit for owner approval a listing of the employees in each work group, including sub-vendors, and their titles/responsibilities.

16.2.5 All personnel working at Ginna shall comply with security requirements for access to Ginna. Some vendor personnel will be given Unescorted Access to the site, which requires screening in accordance with Federal Regulations, including fingerprinting and criminal history background checks. Vendor personnel who do not receive Unescorted Access will require escorted access at all times while on site; this escort shall be provided by the vendor personnel who are given Unescorted Access.

16.2.6 Personnel working at Ginna shall smoke only in designated smoking areas and shall abide by the RG&E Fitness For Duty Program, including the Drug & Alcohol Abuse Policy. Use of cell phones and portable radios is prohibited in certain posted areas adjacent to the area of work; all workers shall obey all posted signs.

16.2.7 This scope of work does not require personnel to perform activities in radiologically controlled or contaminated areas.

16.3 Schedule & Workday

16.3.1 Eight (8) weeks prior to the start of work, vendor shall provide a detailed schedule for installation and testing of the system. The schedule's work breakdown structure shall consist of all significant tasks requiring more than 1 shift to complete. The Ginna Scheduling Department will adopt this schedule, monitor progress, help to coordinate resources for support services, and maintain the schedule current with the most recent progress reports.

16.3.2 All work is to be performed as expected by the schedule and in compliance with the Station Modification (SM) procedure. All work groups shall strive to keep the schedule predictive and achievable.

16.3.3 Vendor's Construction Manager will report progress to the owner's Project Manager on a daily basis and/or to the Ginna Scheduling Department at their 6:30 AM meeting.

Progress reports will be based upon the best available knowledge and the percentage of actual man-hours required for completion of the task; not the estimated man-hours assigned to the task. Job task duration will be reviewed and adjusted as experience dictates.

16.3.3.1 Vendor will give a minimum 48 hours notice to the Owner's Project Manager and to the Scheduling Department of any needs for support services during back shift hours.

16.3.4 The workday shift start time, break time, and shift end shall match the Ginna Maintenance Department schedule. With owner approval these times may vary if needed for individual contracts, labor laws and support of scheduled completion date(s). Breaks may be taken in designate Ginna break areas, including designated smoking areas and the cafeteria. On the job accountability will be the responsibility of the Construction Manager.

16.4 Materials & Material Handling

16.4.1 All material will be shipped to, accounted for, and receipt inspected by, the Owner. Transfer of new material will be done by the Owner, with Vendor's assistance as needed. Items weighing over 100 Lbs. will be delivered to the landing immediately outside of the southeast door of the Relay Room Annex, from which point they are the vendor's responsibility. Vendor personnel shall not use RG&E mobile equipment such as cranes, tractors, forklifts, and vehicles unless specifically trained and authorized to do so.

16.4.2 Prior to being brought onsite, all consumables shall be reviewed and accepted by the Ginna Chemical Controls Coordinator and shall be labeled (Reference 2.2.5).

16.5 Jobsite & Building Services:

Owner will provide the following:

A) Electrical power for welding, power tools, and lights.
B) Service air for pneumatic tools, if required.
C) Scaffold tube, knuckles, lumber & mesh; for scaffold to be erected by vendor.
D) Crane service to deliver materials/equipment to roof of Relay Room Annex.

16.6 Special Conditions (Hot work, scaffold permits, FME, and sensitive equipment)

16.6.1 Vendor is responsible for initiating the request forms and obtaining permits for hot work and scaffolding (References 2.2.6 and 2.2.7).

16.6.1.1 Processes creating an ignition source, such as welding and grinding, will be authorized by, and vendor will take precautions prescribed by, a hot work permit issued by the Owner. Owner will provide the fire watch personnel, if required by the hot work permit.

16.6.1.2 Scaffold shall be erected by vendor as needed, and shall satisfy owner's scaffold inspection.

16.6.2 The offsite power cabinets already located in the Relay Room Annex contain relays that could affect plant operation. During construction in the Relay Room Annex the vendor shall take owner-prescribed precautions for Foreign Material Exclusion (FME, reference 2.2.11) and for protection of these cabinets from bumping or jarring.

16.6.3 The Relay Room located immediately west of the work area houses electrical cabinets containing sensitive equipment that is important to plant safety and/or could trip the plant.

16.6.3.1 Components entering the Annex via the Relay Room shall not be especially heavy or cumbersome since they will pass by these electrical cabinets. Refer to dimensional limits described in section 4.7.

16.6.3.2 Use of cell phones and portable radios is prohibited in the Relay Room and certain posted areas adjacent to the area of work; all workers shall obey all posted signs.

17.0 QUALITY ASSURANCE & QUALITY CONTROL

17.1 The systems installed by this modification shall be Nuclear Safety Related, and Seismic Category I. Per section C.1.n of RG 1.29, the QA requirements of 10CFR50 Appendix B and the notification requirements of 10CFR21 shall be applied to all aspects of the design, procurement, fabrication, installation, & testing.

17.2 The vendor shall have a 10 CFR 50, Appendix B Nuclear Quality Program and shall be fully responsible for quality of his and his subvendors' materials, services, and purchased items. Owner reserves the right of final approval of all subvendors and subcontractors providing the goods or services described in this specification.

17.3 Owner shall review & approve all commercial grade dedication plans and sampling plans for product acceptance. Sampling plans for product acceptance shall assure, with a 95% confidence level, that no more than 5% of the product is nonconforming.

17.4 Design and shop fabrication work shall be performed under the controls of the vendor's QA program & procedures. Owner shall have access to all vendor and sub-vendor facilities to perform random surveillance inspections, to audit, or to otherwise monitor the vendor's QA & QC processes. This includes access to any work packages, records, specifications, procedures, including those used by subvendors, for the purchase, manufacture, or fabrication of the system or it's components.

17.5 Installation & testing phases of the modification that affect quality shall be controlled by the vendor in accordance with the requirements of AG-1 and the vendor's QA program. Vendor shall provide written installation and testing steps that include all required Quality Control hold/witness points and associated acceptance/ rejection criteria; these

Work Instructions will be implemented as described in section 16.1.

17.6 For bidding purposes the visual inspection and NDE performed at Ginna, in accordance with AG-1 sections AA-6330 and AA-6400 (welds & brazing), shall be listed as a separate line item with a fixed, firm cost. At owner's discretion this service may be supplied by the owner.

18.0 DOCUMENTS:

18.1 Required Documents List: During the design phase of the project the vendor shall prepare a Required Documents List that identifies all documents required for QA, QC, and owner approval. Vendor shall submit the complete Required Documents List to the owner for approval prior to the start of fabrication.

18.1.1 The Required Documents List shall have subsections applicable to each of the project's four phases: Design, Procurement/Fabrication, Installation, & Testing.

18.1.2 The Required Documents List will be used to assure completeness of documentation throughout the project. The Required Documents List shall have it's own revision number. For each document listed the Required Documents List shall have checkboxes or yes/no fields to indicate if that document requires owner approval, owner issue for construction, or As-Built revision at the end of the project.

18.1.3 Prior to the start of subsequent phases, all applicable documents required for the previous phase shall be submitted, in their original form, to the owner for approval, for records retention, and for QC surveillance. Any procurement, fabrication, or installation performed prior to owner approval is performed at the vendor's risk.

18.2 Design documents provided by the vendor shall include, but are not limited to:

Drawings certified by the vendor or subvendor
All Design Verification Reports & Certificates (AG-1 section AA-4400)
Structural Design calculations for filter frames and all Non-standard seismic supports
Structural Design calculations for filter housings, including personnel live load calcs.
Fire suppression system hydraulic calculations
Design basis for fans meeting performance
Summary calculation of fan system design, as described in sections 5.2, 8.3.1, and 14.1.3

Electrical design calculations shall include:
Cable selection: size, insulation, grounding, conduit sizing / cable fill
Cable separation per IEEE 384
Required breaker sizing for 480V and 120 VAC control circuits
Documentation of adequate equipment ratings for the application; including coil and contact voltages, contact current, switch ratings, etc.

18.2.1 Design documents provided by the vendor shall include the equipment specifications used

for all active or replaceable subcomponents, including their form, fit, function, and all critical characteristics such as capacity, range, design setpoint, dimensions, materials, etc.

Active subcomponents include, but are not limited to:

fans	motors
switches	instruments
heaters	Pre-, HEPA, & Post-filters
compressors	cooling coils
refrigerant control valves	refrigerant system switches
damper seals	damper bearings
relays	contactors
thermal overloads	

Gasket material for flanged duct connections & for access doors

18.3 Procurement/Fabrication documents provided by the vendor shall include, but are not limited to, the following:

Pre-shipment Test / Inspection reports described in section 14.0.
Weld inspection/data sheets or weld procedures
All Certificates of Compliance and Certificates of Conformance
All Certified Material Test Reports
Drawings certified by the vendor or subvendor to be "as-built"
Circuit schedules prepared in owner approved format.
Maintenance / installation manuals for all subcomponents described in section 18.2.1

18.4 Installation documents shall contain the Work Instructions needed to complete the installation, as described in section 16.1 of this specification. Installation documents provided by the vendor shall include, but are not limited to, the following:

Construction drawings
Procedures

18.4.1 Construction drawings shall show the location and detail of housings, ducts, fans, dampers, instruments, conduits, supports, and all other major components in each of three mutually perpendicular planes. Drawings shall address all design parameters and bounding conditions in order to allow installation of the system as designed.

18.5 Testing documents provided by the vendor shall include, but are not limited to, reports from all tests described in section 14.0 of this specification.

18.6 Submittal, Review, & Issue of documents:

18.6.1 Submittal:

18.6.1.1 All documents listed on the Required Documents List shall be submitted to:

Dan Crowley
Rochester Gas and Electric - Ginna Station
1503 Lake Road
Ontario, NY 14519
PH: (585) 771-3381
FAX: (585) 771-3907

18.6.1.2 All documents originating from an electronic file shall be provided to the owner in hardcopy form or in an electronic form compatible with the following software used by the owner:

For text files: Corel WordPerfect, release 8.0; or MS Word 97
For drawings: AUTOCAD release 14 or 2002

18.6.2 Review:

18.6.2.1 Owner's review of engineering documents will cover general conformity of the content to the specifications and design requirements, external connections, interfaces with equipment and materials furnished under separate specifications, and dimensions which affect plant arrangement. The owner's review does not indicate a thorough review of all dimensions, quantities, and details of the equipment, material, device, or item indicated or the accuracy of the information submitted. Owner's review does not relieve the vendor from any responsibility for document correctness, constructability in the field, or compliance with requirements of this specification.

18.6.2.2 Any deviation from this specification shall be submitted to the owner, in writing, for approval.

18.6.3 Issue:

For installation & testing purposes, a copy of all documents reviewed by the owner will be issued with one of the following status categories:

18.6.3.1 RELEASED FOR CONSTRUCTION (Status "CN") - This status indicates the owner approves the document for use as Work Instructions described in section 16.1.

18.6.3.2 RELEASED FOR LIMITED CONSTRUCTION AS NOTED (Status "LC"): This status indicates the owner approves, with limits or exceptions as noted, the

document for use as Work Instructions described in section 16.1.

18.6.3.3 APPROVED (Status "A") - This status indicates that the document satisfies the owner's acceptance criteria.

18.6.3.4 APPROVED AS NOTED (Status "AN") - This status indicates that the documents are acceptable provided comments are accepted by the vendor. Documented evidence that vendor has accepted document comments is not required.

18.6.3.5 INFORMATION (Status "I") – Designates that the document is for information only, and shall not to be used as Work Instructions described in section 16.1

18.6.3.6 Any drawing or document that is NOT marked with one of the status categories listed above shall be considered preliminary or draft information, and shall not be used as a basis for design, procurement, fabrication, construction, or testing.

18.6.3.7 ALL Design outputs to be used during fabrication, installation & testing shall be distributed by the owner with the status "released for construction" (refer to Work Instructions, section 16.1 of this specification). Vendors and their representatives receiving documents "released for construction" shall adhere to procedures for controlled copy holders. (Reference 2.2.9). Any procurement, fabrication, or installation performed without the guidance of a document having "released for construction" status is performed at the vendor's risk.

18.7 Document Closeout

18.7.1 After completion of acceptance testing all Vendor-generated drawings shall be revised to incorporate information from any applicable MDCNs, to be designated as "As-built", and shall then be transmitted, in both hardcopy and electronic form, for owner approval.

18.7.2 Changes made during the installation phase of the project may affect design limits or assumptions; vendor shall revise any and all vendor-generated design documents that may be affected by MDCNs.

18.7.3 Vendor shall prepare and submit for Owner's records, a Final Design Verification that will reconcile all design changes made during the installation, and demonstrate that procedures used during installation satisfy the requirements of the Engineering and Design Analyses. The Final Design Verification shall specifically refer to, and shall address closure of, all MDCNs initiated for the project.

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED:

DWG NO.33013-3000 "CONTROL ROOM HVAC CONTROL ROOM EMERGENCY AIR TREATMENT SYSTEM (CREATS) AND EMERGENCY COOLING SYSTEM MODIFICATION P & ID."

WITHIN THIS PACKAGE

D-01

Sequence of operation - CREATS, PCR 2000-0024

1.0 Modes of Operation:

1.1 NORMAL:

The existing Control Room HVAC system will provide heating, cooling, and fresh air to the Control Room.

1.2 EMERGENCY:

Upon receipt of a EMERGENCY signal (see section 3.2.1) the Control Room Emergency Zone (CREZ) will be isolated, and each new 100% capacity train of Control Room Emergency Air Treatment System (CREATS) will filter and recirculate 6000 CFM (±10%) of Control Room air. The CREATS fans will be 1E powered and will start from a manual pushbutton isolation signal, toxic gas signal, radiation monitor signal, Safety Injection (SI) signal, or from the manual hand switch for the fan. The new trains of CREATS will not have a pressurized mode of operation, but the CREATS system duct and damper design preserved the capability of adding this mode of operation in the future, if required. The existing CREATS filter and fan will be disconnected and may be removed or abandoned in place as part of the modification.

1.3 EMERGENCY HEATING/COOLING:

Two new 100% capacity Emergency Heating/Cooling Systems will automatically heat or cool the Control Room, as needed, whenever the associated CREATS fan is in operation. Emergency Heating/Cooling Systems will be 1E powered, and will strip upon SI.

1.4 PURGE:

This mode is the same as the NORMAL mode of operation, except that the maximum amount of fresh air and exhaust air will be provided. This mode will be over-ridden by an EMERGENCY signal which isolates the CREZ and trips the NORMAL mode fans. However, with local operator action a purge flow can also be established from a different outside air source (Relay Room Annex) while in the EMERGENCY mode of operation.

2.0 Arrangement of Controls & Indication:

Control panels on the Auxiliary Benchboard (ABB) where the existing CREATS controls are located will be reconfigured. The new controls arrangement is shown on the attached ABB layout drawings.

2.1 NORMAL

2.1.1 Similar to the existing arrangement; the Auxiliary Benchboard (ABB) will have a pistol-grip switch for the Control Room NORMAL supply & return fans, and red & green lights indicating fan status.

2.2 EMERGENCY

2.2.1 At the ABB two pushbuttons will provide the manual CREATS actuation feature. Each pushbutton will start ONE train of CREATS fan, and close ALL of the Control Room Emergency Zone (CREZ) isolation dampers.

2.2.2 At the ABB, each train will have a pushbutton to provide isolation reset for that train. To re-open the

isolation dampers both reset pushbuttons must be pushed (independently or simultaneously).

2.2.3 Lights on the ABB will indicate position of isolation dampers in each of the three flowpaths isolated by dampers AKD02, AKD03, AKD21, AKD22, AKD23, AKD24. Lights will be controlled by end switches installed on each damper. To minimize the number of lights on the ABB a single green light for each damper will indicate when the associated damper is closed.

2.2.4 At the ABB two white lights will indicate high temperature sensed at either train's charcoal filter inlet and outlet (TAH-5153A/B and TAH-5154A/B). Two other white lights will indicate a low flow condition from either CREATS fan (FS-5150A & FS-5150B).

2.2.5 At the ABB the CREATS fans AKF10A & B will each have a manual switch (PS/STOP/AUTO/START) with a green and a red light indicating fan status. A red & a green light will also indicate status of the associated fan's discharge damper.

2.2.6 Defeat of an isolation signal, if required, will be performed at the associated monitor's control panel (toxic gas monitors on the Turbine deck, or radiation monitors R-45 & R-46 at the RMS rack in the Control Room). There will be no switch for defeat of the isolation signal from SI or the manual isolation pushbuttons.

2.2.7 Area radiation monitor R-1 will provide indication only. Alarm of R-1 will no longer provide an EMERGENCY signal, CREATS fan start, isolation damper closure, or override of the PURGE mode.

2.3 EMERGENCY HEATING/COOLING

2.3.1 At the ABB two pushbuttons will allow reset of power to the Emergency Cooling and the electric heaters, following reset of the SI signal. This prevents automatically loading equipment on the D/Gs when SI is reset.

2.3.2 Emergency Heating/Cooling Systems will be controlled by thermostats located in the Control Room. Since it employs the airflow from the CREATS fan, a low flow signal (FS-5150A & FS-5150B) indicates loss of both the CREATS filtration and the Emergency Heating/Cooling functions for that train.

2.4 PURGE

2.4.1 At the ABB a switch labeled "Normal/Purge" will initiate the purge mode of operation.

3.0 Alarms & Operator Interface:

3.1 NORMAL

3.1.1 The pistol-grip switch and red/green status lights are self explanatory.

3.2 EMERGENCY

3.2.1 An EMERGENCY signal originates from any of the following circuits, each of which has two trains: SI, radiation monitors (R-45 & R-46, not R-1), toxic gas monitors, or manual isolation. An EMERGENCY signal will:

1. Close isolation dampers AKD02, AKD03, AKD21, AKD22, AKD23, & AKD24.
2. Start the associated train of CREATS fan, AKF10A or B (except radiation monitors, which will start both CREATS fans)
3. Trip the normal CR HVAC supply, return, and lavatory fans and heating elements (AKF03,

AKF08, AKF09, & AKA03).

4. Energize Main Control Board (MCB) annunciator E-11; "Control Room HVAC Isolation".

3.2.2 One or both CREATS fans may be secured in the pull stop position at the discretion of the Control Room operator any time after the fans automatically start.

3.2.3 Existing damper AKD02 and new dampers AKD03, AKD21, AKD22, AKD23 & AKD24 are all normally open and will close upon any EMERGENCY signal. All of these dampers will fail closed upon loss of power or instrument air, as applicable, and green lights for each flow path will operate as described in section 2.2.3.

3.2.4 Dampers AKD35A & AKD35B are back draft dampers that are normally closed, their motor actuators will allow the damper to open when the associated fan receives a start signal, or upon loss of power to the actuator.

3.2.5 If FS-5150A or FS-5150B indicates low flow when it's associated CREATS fan has a start signal, then the white low flow light at the ABB, and the new Main Control Board (MCB) alarm E-8 will be energized, to alert operators to the potential loss of a SR function. A 10 second time delay after the fan start signal will allow flow to be established before this alarm is enabled.

3.2.6 If there is no EMERGENCY signal (as defined in 3.2.1), and any SI signal has been reset, then pressing both Control Room Isolation reset pushbuttons will:

1. Open the isolation dampers; AKD02, AKD03, AKD21, AKD22, AKD23, & AKD24
2. Clear MCB alarm annunciator E-11; "Control Room HVAC Isolation"
3. Secure both trains of CREATS in auto
4. Allow re-start of normal HVAC; AKF03, AKF08, AKF09, & AKA03

3.2.7 One or both CREATS fans may be manually started at any time by taking the fan switch to the 'START' position, in which case Control Room isolation will not occur. However, new Main Control Board (MCB) alarm E-8 will be energized to indicate the off-normal condition, direct the logging of charcoal filter run-time, and prevent redundant heating/cooling.

3.2.8 In addition to energizing ABB indicating lights, an alarm from temperature switches TAH-5153A/B or TAH-5154A/B will alarm MCB annunciator K-31 in the Control Room.

3.2.9 The outside air damper control valve for use in the EMERGENCY mode (located in the Control Room Kitchen) will no longer function, and will be removed or abandoned in place. Except for room thermostats, all Control Room HVAC system controls, including CREATS controls, will be located on the ABB.

3.3 EMERGENCY HEATING/COOLING

3.3.1 Operator interface with the Emergency Heating/Cooling system is limited to thermostats in the Control Room, and alarms that indicate a problem with the system. These features are described in section 4.3.

3.4 PURGE

3.4.1 The outside air damper control valve for use in the fire mode (located in the Control Room Kitchen) will no longer have a function and will be removed or abandoned in place.

3.4.2 Switching to the PURGE mode will energize the new MCB alarm E-8 to make operators aware of the off-normal system alignment.

4.0 Automatic Controls / Interlocks:

4.1 NORMAL

4.1.1 Temperature control will continue to be automatic via thermostats & zone dampers.

4.1.2 Heater staging and instrument air pressure interlock of the electric heaters will be re-configured to improve temperature control and ensure a fail-safe condition upon loss of IA. Permissive flow switch FS-5154 will be maintained to ensure electric heaters are not energized without airflow.

4.2 EMERGENCY

4.2.1 Each train of Emergency Heating/Cooling System will strip upon an SI signal in the associated SI train. Re-energizing these components will require SI reset and subsequent Emergency Heating/Cooling reset at the ABB.

4.2.2 If carbon filter temperature switches TAH-5153A/B or TAH-5154A/B sense a high temperature then the associated CREATS fan AKF10A/B will trip, the associated CREATS discharge damper AKD35A/B will close, an ABB indicating light will be energized, and MCB annunciator K-31 will alarm.

4.3 EMERGENCY HEATING/COOLING

4.3.1 Each train of Emergency Heating/Cooling system will strip upon an SI signal in the associated SI train. Re-energizing these components will require SI reset and subsequent Emergency Heating/Cooling reset at the ABB.

4.3.2 A low or high refrigerant pressure will trip the Emergency Cooling System compressor(s) & condenser cooling fan, and energize the new MCB alarm E-8. The high & low pressure alarms will be operable even when Emergency Heating/Cooling is secured, in order to indicate a potential refrigerant leak and inoperability of the equipment.

4.3.3 Each Emergency Heating/Cooling System train will have a thermostat that controls heating & cooling to maintain suitable room temperature. An Emergency Heating/Cooling System will be energized only if:

1. Associated CREATS fan is running,
2. Low flow switch FS-5150A/B is not in alarm
3. High and low refrigerant pressure switches are not in alarm (interlock for cooling only)
4. No SI signal is present (SI must reset at MCB and at the new ABB SI reset pushbuttons)
5. Necessary to satisfy room thermostat TC-5150A/B.

4.4 PURGE

4.4.1 The PURGE mode of operation will open existing dampers AKD01 & AKD04 to their limit stops, providing up to 2000 CFM of fresh air and an equal amount exhaust air from the Control Room.

4.4.2 The function of the PURGE mode is lost when an EMERGENCY signal isolates the CREZ , trips the NORMAL fans, and starts CREATS. A manually initiated alternative is described in section 5.4.2.

5.0 Manual Features:

5.1 NORMAL

5.1.1 The existing switch located on column F12, on the Turbine deck outside the Control Room, will be disabled. This is because of concern for a switch located in a Non-vital area controlling an ESF ventilation system, and because it's use during a postulated Control Room fire would not conform with the fire response procedures that normally trip equipment at it's associated breaker, instead of a control switch.

5.2 EMERGENCY

5.2.1 Upon high temperature sensed at TAH-5153A/B or TAH-5154A/B a fire response procedure will direct operators to verify a high temperature and, if required, connect a fire hose to the charcoal filter's deluge system header in order to douse the fire.

5.2.2 Dampers AKD30A/B and AKD31A/B will be low leakage dampers that can be secured in the closed position. Along with their associated discharge dampers AKD34A/B & AKD35A/B they will provide an isolation boundary that allows opening of the filter systems' pressure boundary without compromising integrity of the Control Room Emergency Zone.

5.2.3 The need for the manual heat control currently used in the EMERGENCY mode of operation will be eliminated.

5.3 EMERGENCY HEATING/COOLING

5.3.1 Emergency Heating/Cooling can be manually actuated, without closing the CREZ isolation dampers, by starting a CREATS fan, otherwise Emergency Heating/Cooling have no manual features.

5.4 PURGE

5.4.1 The PURGE mode will be manually actuated via a switch on the ABB and will be over-ridden by any EMERGENCY signal.

5.4.2 In the EMERGENCY mode of operation an alternate source of outside air can be provided by the local operator action of removing the blind flange(s) adjacent to dampers AKD32A/B and opening the door(s) of the Relay Room Annex.

CONTROL ROOM MANUAL ISOLATION A PB/CRIA

CONTROL ROOM ISOLATION RESET A PB/CRIRA

G R

CREATS TRAIN A DISCHARGE DAMPER AKD35A

G R

CREATS FAN A AKF10A

START

PULL

STOP

PULL OUT

W

CREATS TRAIN A HIGH TEMP. TAH-5153A TAH-5154A

W

CREATS TRAIN A LOW FLOW FC-5150A

SI RESET CREATS TRAIN A PB/CRSIRA

#1 TRANSFORMER
#2 TRANSFORMER
#12A TRANSFORMER
AREA #2
#12B TRANSFORMER
TURBINE ISLAND SPRINKLER

TURB ISLAND SPRINKLER

1G FAN FILTER

SERVICE BLDG SPRINKLER

AREA 2 ISLAND TROUBLE

NO. 11 TRANS. SYS ON

NO. 12A TRANS. SYS ON

NO. 12B TRANS. SYS ON

NO. 1 GEN TRANS. SYS ON

G W

AUTO/ON TAMPER
1G FILTER

1G CHARCOAL FILTER DELUGE SO2 PB/1GSO2

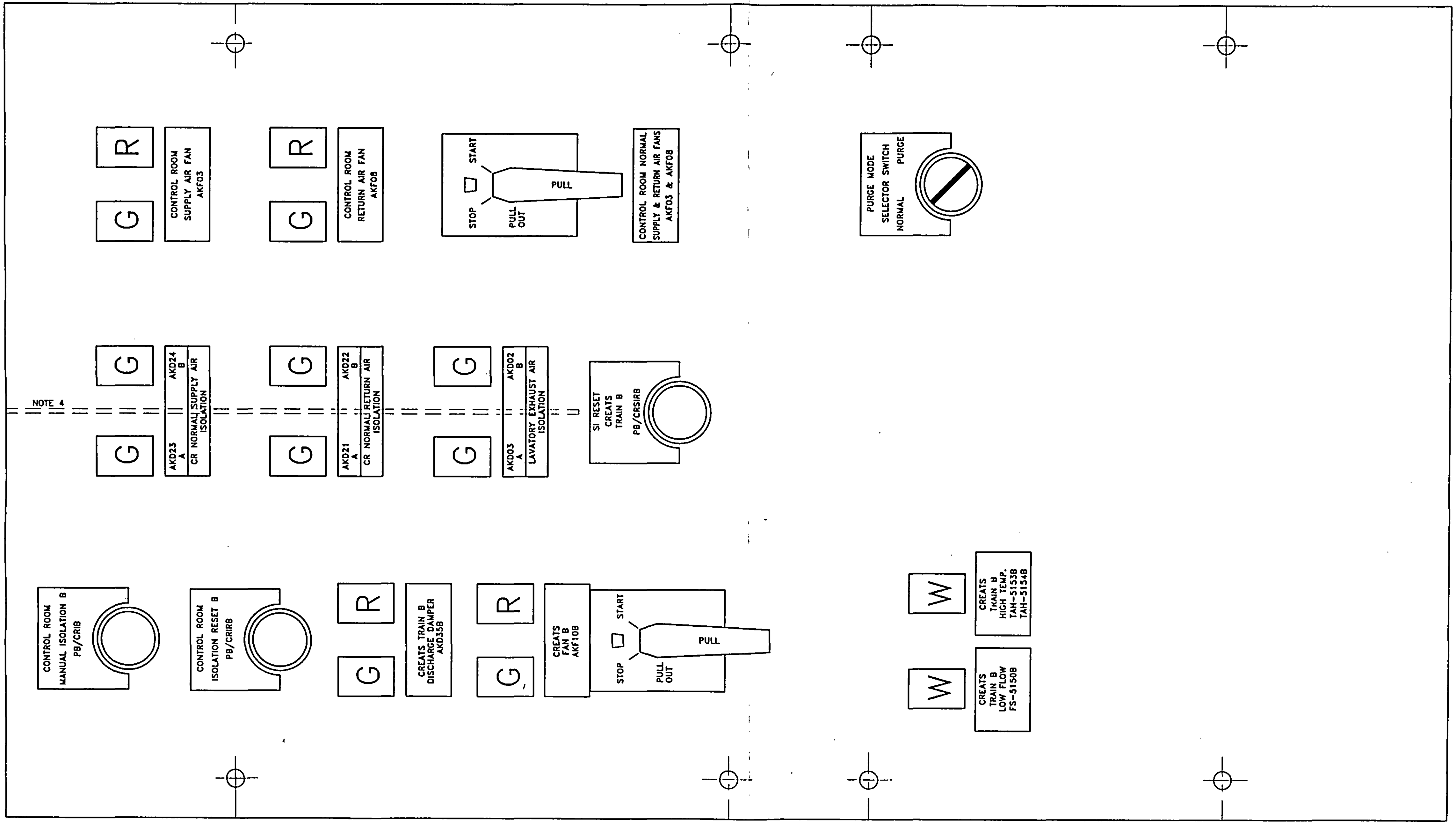
COVERED SWITCH

NOTES:
1. ALL WORK IN THE AUXILIARY BENCHBOARD (ABB) MUST BE DONE IN A MANNER TO MINIMIZE DISTURBANCE TO THE EXISTING COMPONENTS.
2. SEE WIRING DIAGRAMS FOR WIRING DETERMS AND CONNECTIONS.
3. FABRICATE (2) COPIES OF EVERY TAG SHOWN ON THIS DRAWING IN ACCORDANCE WITH PROCEDURE A-56.4, AND INSTALL THEM ON THE AUXILIARY BENCHBOARDS (ABB) LOCATED IN THE MAIN CONTROL ROOM AND ALSO IN THE SIMULATOR CONTROL ROOM. UNLESS IDENTICAL TO NEW TAGS, ALL EXISTING TAGS SHALL BE REPLACED. ALL NEW TAGS SHALL BE WHITE BACKGROUND WITH BLACK LETTERS.

7/12/84	INFORMATION ONLY				RS
DATE	RELEASED FOR				ENGINEER
ORIGINAL		AJV3	RJC	RS	JEF
		8/13/80	8/13/80	7/12/84	7/12/84
REV	REVISED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	1"=1"				
CAD FILENAME	SK3G1734-1				

AUXILIARY BENCHBOARD
CENTER SECTION
(FRONT VIEW)

JOB NUMBER	DRAWING NUMBER	SHEET	REV
	SK33013-1734-1		



NOTES:

1. ALL WORK IN THE AUXILIARY BENCHBOARD (ABB) MUST BE DONE IN A MANNER TO MINIMIZE DISTURBANCE TO THE EXISTING COMPONENTS.
2. SEE WIRING DIAGRAMS FOR WIRING DETERMS AND CONNECTIONS.
3. FABRICATE (2) COPIES OF EVERY TAG SHOWN ON THIS DRAWING IN ACCORDANCE WITH PROCEDURE A-56.4, AND INSTALL THEM ON THE AUXILIARY BENCHBOARDS (ABB) LOCATED IN THE MAIN CONTROL ROOM AND ALSO IN THE SIMULATOR CONTROL ROOM. UNLESS IDENTICAL TO NEW TAGS, ALL EXISTING TAGS SHALL BE REPLACED. ALL NEW TAGS SHALL BE WHITE BACKGROUND WITH BLACK LETTERS.
4. PLATE WELDED ON BACKSIDE OF PANEL COVER TO PROVIDE SEPARATION BETWEEN A AND B TRAIN WIRES TO DAMPER LIGHTS.

3/12/04	INFORMATION ONLY				
DATE	RELEASED FOR				ENGINEER
△					
△	ORIGINAL	AJV3			
		8/13/03			
REV	REVISED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	1"=1"				
CAD FILENAME	SK3G1735-1				

AUXILIARY BENCHBOARD
RIGHT SECTION
(FRONT VIEW)

JOB NUMBER	DRAWING NUMBER	SHEET	REV
	SK33013-1735-1		△

Overview of Electrical Information

1. Single Line drawing of Power cables for new 480 volt MCCs and equipment

A marked-up copy of 33013-2539 showing where new MCC's N and P will be connected to the rest of the 480 volt system is included. Two one-line sketches labeled A480 and B480, show one line and cable routing from MCC's C and D to new MCC's N and P, and to new loads.

2. Tray Drawings showing separations for 480 volt power

Circuit schedules C5618 and C5619 show cable routing for the A and B train 480 volt power cables respectively. These circuit schedules demonstrate that no trays are shared. Drawing 33013-3002 sheet 2 have been issued for construction, they show the cable trays utilized in the battery rooms and demonstrate the separation maintained between the two trains. This drawing also shows equipment location of MCCs, transformers, and panels in Relay Room Annex, and displays that all 480 volt cable in the Relay Room and Annex is routed in conduit.

3. Diesel Generator Loading Analysis, including new Fan acceleration

Preliminary evaluation of the new loads versus existing diesel generator loading calculations indicates that there is adequate margin for the addition of the new CREATS emergency fans. New CREATS heating units and cooling units will trip on SI, so have not been included in evaluations against short term diesel loading. For long term operation, preliminary evaluation indicates that there is adequate margin for adding the new heating and cooling system after initial SI loads have been reduced. We are awaiting speed torque curves from the fan vendor to demonstrate that acceleration time and loading will be appropriate to allow loading of the fans on the diesels at SI time = 0.

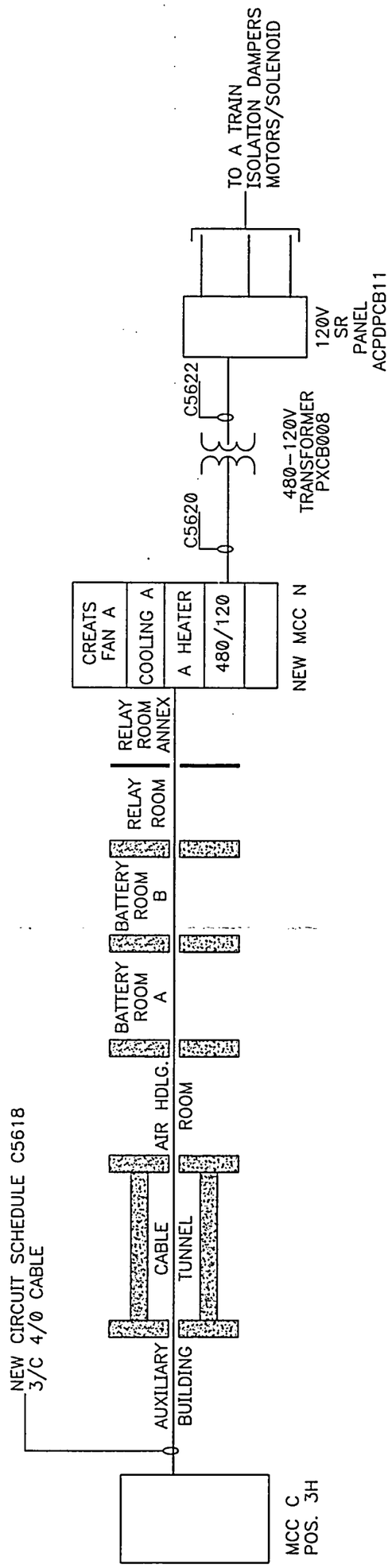
4. Damper Isolation Actuators

Th actuators on the isolation dampers are all power to open, with spring return close on loss of power. Included is a cutsheet for the SURE 100 electric actuator Our final configuration is awaiting input from the vendor as to mounting which will determine clockwise or counterclockwise rotation, and wiring connections will be made for the configuration that ensures that the damper will close to the isolation position for all failure modes. Likewise, solenoids for the air operated dampers will close the damper when de-energized and on loss of air. Elementary wiring diagrams 10905-0825 sheets A and B illustrate that the damper actuators (MO/AKD21 thru 24, and solenoids 14922S and 14930S) are all de-energized by the R81AX and R81BX relays. The breakers supplying these devices will be sized to provide adequate capacity to preclude unnecessary trips while providing adequate protection to the cable. Specific calculations and formal calculations demonstrating these points will be prepared as part of the modification process and will be completed before installation.

5. Elementary wiring diagrams for the main isolation logic and controls for the main CREATS equipment are attached. These elementaries reflect the operation of the equipment in accordance with the Sequence of Operations document and auxiliary benchboard layout drawings that are also included with this submittal.

CREATS

480 VOLT
NEW CABLE ROUTING



2/10/04	INFORMATION ONLY			PS	
DATE	RELEASED FOR			ENGINEER	
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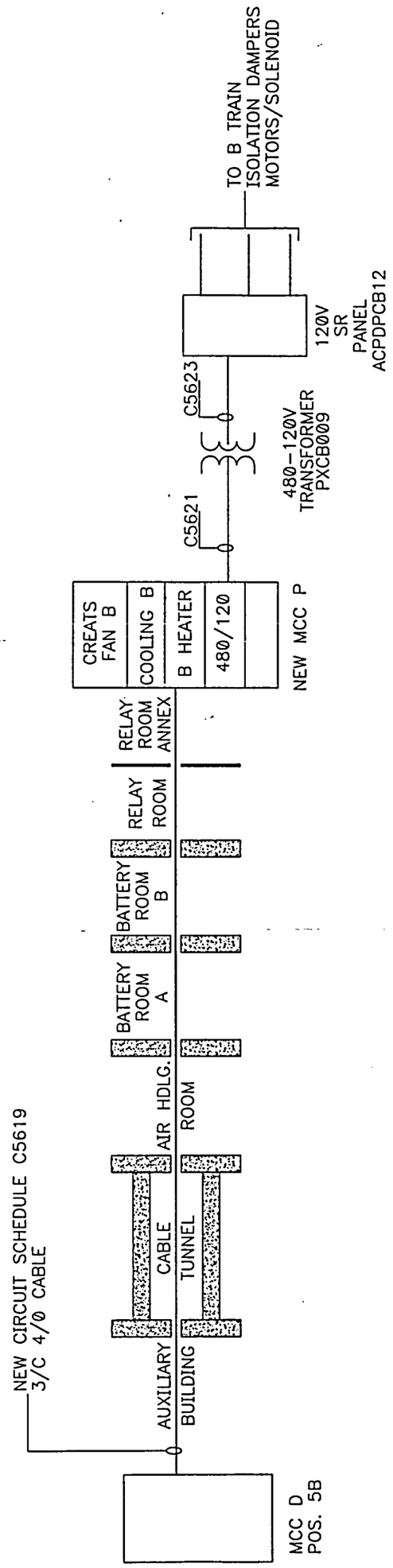
		2/6/04	2/10/04	2/10/04	2/10/04
REV	REVISED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	NONE				
CAD FILENAME	1G069901				

ELECTRICAL

CREATS
480 VOLT SUPPLY ONE LINE
A TRAIN

JOB NUMBER	DRAWING NUMBER	SHEET	REV
PCR 2003-0037	10904-0699	1	0



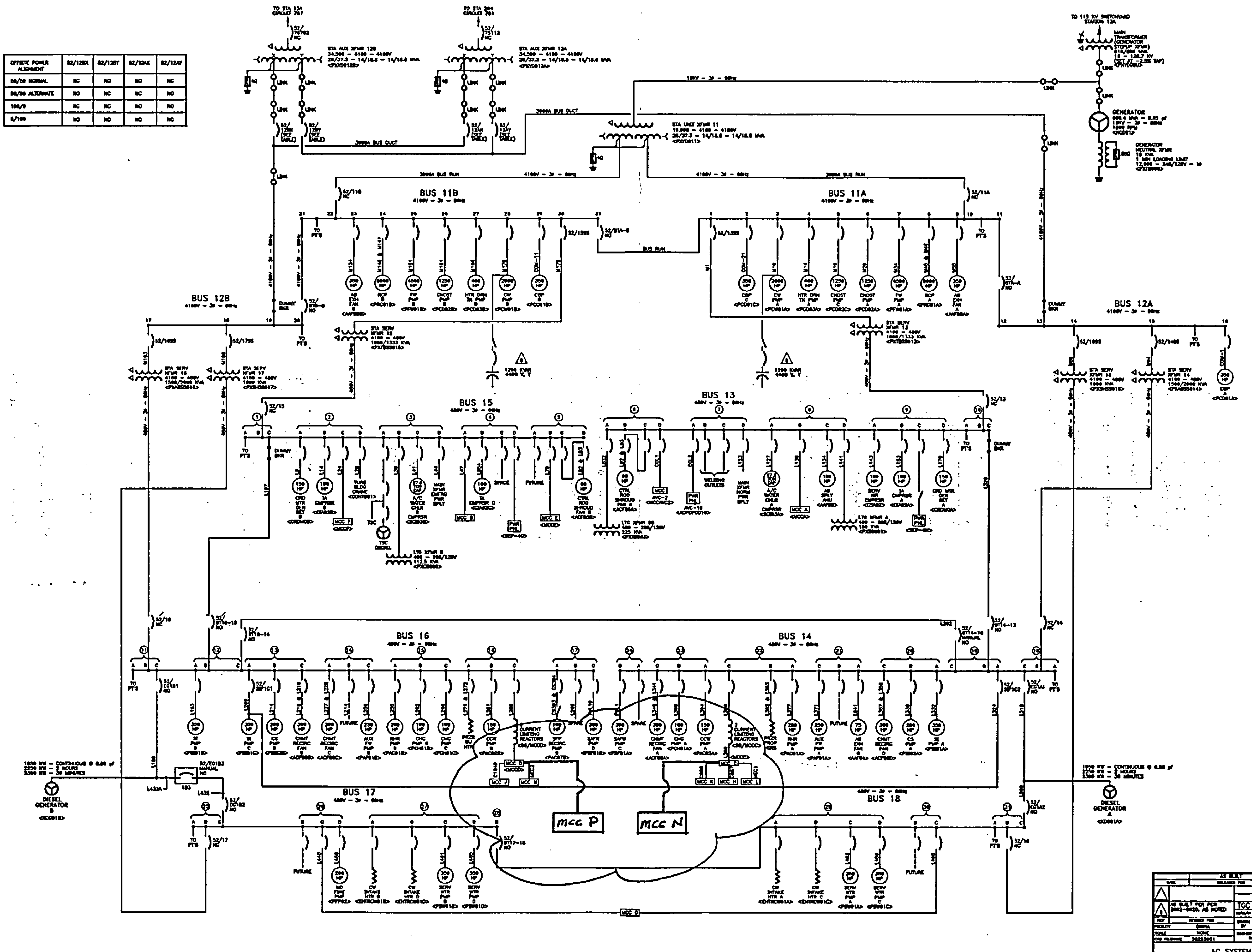
2/10/04	INFORMATION ONLY			PS	
DATE	RELEASED FOR			ENGINEER	
0	ORIGINAL	AJV3	KAE	PS	JEI
		2/6/04	2/10/04	2/10/04	2/10/04
REV	REVISED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	NONE				
CAD FILENAME	1G069902				

ELECTRICAL

CREATS
480 VOLT SUPPLY ONE LINE
B TRAIN

JOB NUMBER	DRAWING NUMBER	SHEET	REV
PCR 2003-0037	10904-0699	2	0

OFFSITE POWER ALIGNMENT	52/12BX	52/12BY	52/12AX	52/12AY
50/50 NORMAL	NC	NO	NO	NC
50/50 ALTERNATE	NO	NC	NC	NO
100/0	NC	NC	NO	NO
0/100	NO	NO	NO	NO



REFERENCES:

33013-0023 MAIN ONE LINE OPERATING DIAGRAM
33013-0057 480V ONE LINE WIRING DIAGRAM
33013-0063 4160V ONE LINE WIRING DIAGRAM
33013-2400 ONE LINE WIRING DIAGRAM - AC ELECTRICAL SYSTEM
34000-0100 4160V SWITCHGEAR INDEX
34400-0100 480V SWITCHGEAR INDEX

AS BUILT

AS BUILT PER PCR, AS NOTED

TGC

FACILITY GINNA

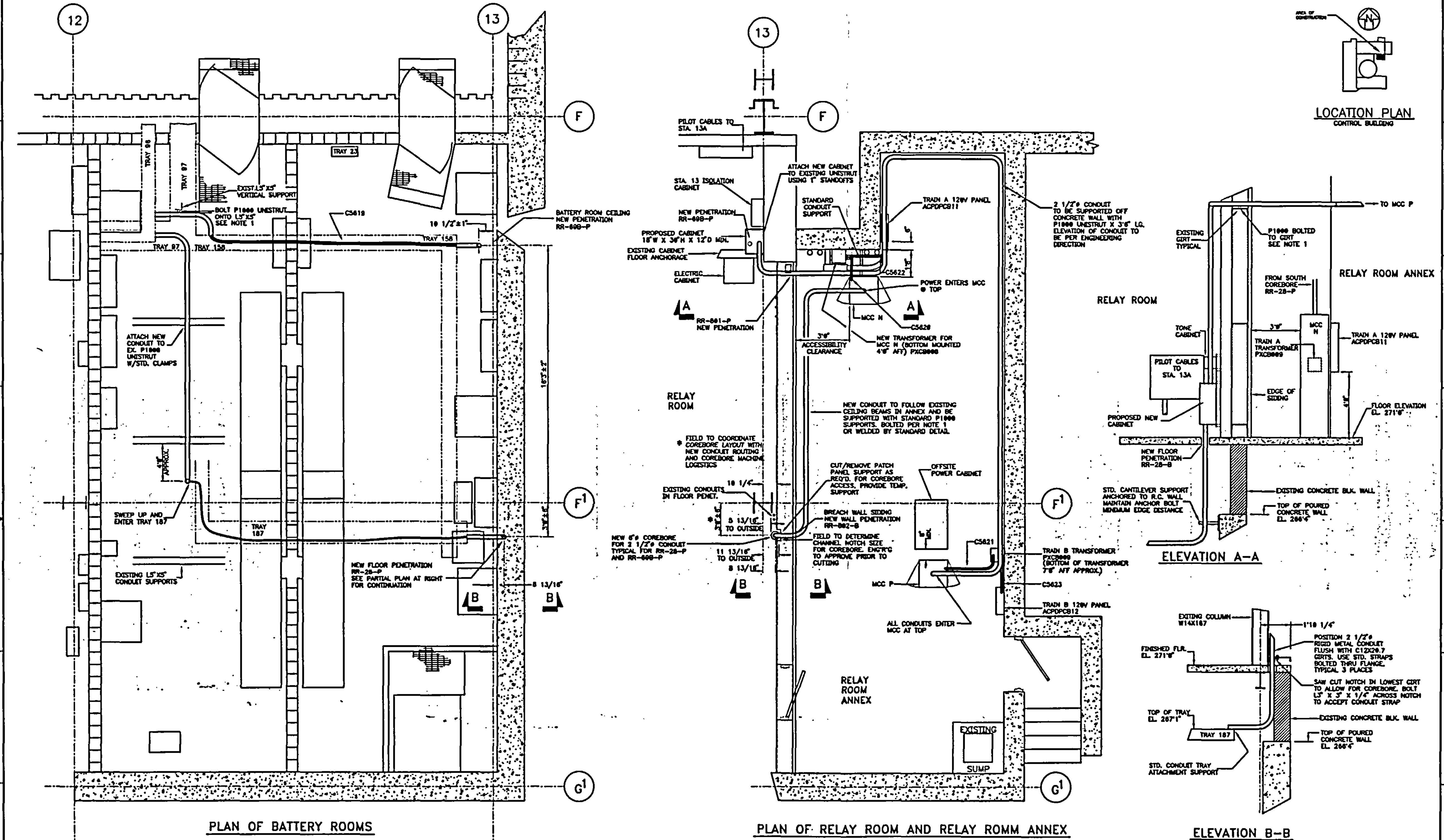
SCALE NONE

AC SYSTEM
PLANT LOAD DISTRIBUTION

ONE LINE WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
4777	33013-2539		

CCD 3 CNTRL COPY



NOTES:

1. STANDARD SEISMIC SIMPLE SPAN P1000 SUPPORTS TO BE BOLTED THROUGH BACK OF UNISTRUT TO EXISTING STRUCTURAL STEEL USING 1/2" SAFETY RELATED GRADE 8 HARDWARE. TORQUED BOLTS, DOUBLE NUTTED BOLTS, OR UPSET THREADS ARE ACCEPTABLE LOCKING MECHANISMS.

REFERENCE DRAWINGS:
GAI 33-501-403
D-502-023
RGE 33013-1653

B	ORIGINAL	AJV3	MBF	MBF	PS
		11/5/03	1/7/04	1/7/04	1/8/04
NUMBER	REVISION	DRAWN BY	CHECKED	RESP. ENG.	REVIEWER
CAD FILENAME	3013002				

DATE	RELEASED FOR	ENGR.
1/8/04	CONSTRUCTION	PS
	LIMITED CONSTRUCTION: AS NOTED	
	PRELIMINARY NOT FOR CONSTRUCTION	
	BIDDING PURPOSES	
	PROCUREMENT	

FACILITY GINNA STATION — ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK

SCALE AS NOTED

CONTROL BUILDING
CONDUIT LAYOUT
480V POWER – CREATS

JOB NO.	DRAWING NO.	SHT	REV.
PCR 2003-0037	33013-3002	2	B

ROCHESTER GAS AND ELECTRIC CORP. - GINNA STATION CIRCUIT SCHEDULE

Page: 1 of 2 Date: 01/05/043 Rev.: A Circuit No.: C5618

Prepared: _____ Reviewed: _____ Approved: _____

Project : CREATS ELECTRICAL
Job No. : PCR 2003-0037
Other : Attachment 4
Misc. :

Date	Status	Engr.
1/9/03	CONSTRUCTION	

Conductors

No. of Cables	No. of Cond.	Cable Size	Shield	Operating Voltage	Cable Rating	BOM / PO#	Cable Length
1	3/C	4/0 AWG	NONE	480	600	MID5005459	500

Conduit(s)

Size	Length
2-1/2	100
2-1/2	75
2-1/2	55

Cable Routing

C5618, 97, C5618_1, 187, C5618_2

Work Group / QC Verification and Validation

Reel No.	Cut Length	QC Cable	QC Pull	QC Conduit	QC Tag

Nature of Circuit: *P 480 VAC POWER*

Division: A - TRAIN A

3 Phase: YES

Maintained Spacing: YES

Appendix R Safe Shutdown: NO

Safety Classification: SAFETY CLASS-3

From Equip : MCCC/03H
From Desc : MCCC POSITION 3H
From Drawing: PCR ATTACHMENT 5

To Equip : MCCN
To Desc : MCCN MAIN LUGS
To Drawing : PCR ATTACHMENT 5

Term Block	Term No.	Wire Mark	Base / Trace Color	Cont. WG	Cont. QC	Megger COND	Megger SHD	Megger QC	From WG	From QC	To WG	To QC	Term Block	Term No.
52/MCCN	L1	L1											1A	L1
52/MCCN	L2	L2											1A	L2
52/MCCN	L3	L3											1A	L3

ROCHESTER GAS AND ELECTRIC CORP. - GINNA STATION CIRCUIT SCHEDULE

Page: 2 of 2 **Date:** 01/05/043 **Rev.:** A **Circuit No.:** C5618

NOTES:

1) CONDUIT ROUTINGS ARE SHOWN ON DRAWING 33013-3002 SHEETS 1 - 3.
2) USE THE FOLLOWING FIRE BARRIER PENETRATIONS FOR ROUTING OF THE CONDUIT/CABLE:
AB OP FLR TO MEZZ: (NEW) A-363A-P, REQUIRES 12" MINIMUM FOAM SEAL DEPTH.
AB MEZZ TO CABLE TUNNEL: A-TRAY-97-P
CABLE TUNNEL TO AHR: AH-TRAY-97-P
AHR TO BATTERY ROOM A: BA-8-P
BATT RM A TO BATT RM B: BB-51-P (TRAY 187)
BATT RM B TO RELAY RM: (NEW) RR-28-P, REQUIRES 8" MINIMUM FOAM SEAL DEPTH.
RELAY ROOM TO ANNEX: (NEW) RR-802-P
3) REPAIR ALL FIREBARRIER PENETRATION BREECHES PER M-56.3, TO EXISTING CONDITIONS.
4) CONDUITS THAT GO INTO RELAY ROOM REQUIRE INTERNAL KAOWOOL SEAL TO MINIMIZE POTENTAIL HALON LEAKAGE.

ADDITIONAL REFERENCE DRAWINGS:

Elementary:
Other Dwg. 1:
Other Dwg. 2:
Other Dwg. 3:

Inst. / Tool I.D. Numbers				
Approval:				
	WG Supervisor (s)	Date (s)	QC Supervisor (s)	Date (s)

WG / QC Remarks:

ROCHESTER GAS AND ELECTRIC CORP. - GINNA STATION CIRCUIT SCHEDULE

Page: 1 of 21 (73) Date: 01/05/04 Rev.: A Circuit No.: C5619

Prepared: _____ Reviewed: _____ Approved: _____

Project : CREATS ELECTRICAL
Job No. : PCR 2003-0037
Other : Attachment 4
Misc. :

Date	Status	Engr.
1/9/04	CONSTRUCTION	

Conductors

No. of Cables	No. of Cond.	Cable Size	Shield	Operating Voltage	Cable Rating	BOM / PO#	Cable Length
1	3/C	4/0 AWG	NONE	480	600	MID5005459	500

Conduit(s)

Size	Length
2-1/2	8
2-1/2	75

Cable Routing

62, 171, 96, C5619, 158, C5619_1

Work Group / QC Verification and Validation

Reel No.	Cut Length	QC Cable	QC Pull	QC Conduit	QC Tag

Nature of Circuit: *P 480 VAC POWER*

Division: B - TRAIN B

3 Phase: YES

Maintained Spacing: YES

Appendix R Safe Shutdown: NO

Safety Classification: SAFETY CLASS-3

From Equip : MCCD/5B
From Desc : MCCD POSITION 5B
From Drawing: PCR ATTACHMENT 5

To Equip : MCCP
To Desc : MCCP MAIN LUGS
To Drawing : PCR ATTACHMENT 5

Term Block	Term No.	Wire Mark	Base / Trace Color	Cont. WG	Cont. QC	Megger COND	Megger SHD	Megger QC	From WG	From QC	To WG	To QC	Term Block	Term No.
52/MCCP	L1	L1											1A	L1
52/MCCP	L2	L2											1A	L2
52/MCCP	L3	L3											1A	L3

NOTES:

1) CONDUIT ROUTINGS ARE SHOWN ON DRAWING 33013-3002 SHEETS 1 & 2.

2) USE THE FOLLOWING FIRE BARRIER PENETRATIONS FOR ROUTING OF THE CONDUIT/CABLE.

AB MEZZ TO CABLE TUNNEL: A-TRAY-96-P

CABLE TUNNEL TO AHR: AH-TRAY-96-P

AHR TO BATTERY ROOM A: BA-8-P

BATT RM A TO BATT RM B: BB-59-P (TRAY 158)

BATT RM B TO RELAY RM: (NEW) RR-69B-P, REQUIRES 8" MINIMUM FOAM SEAL DEPTH.

RELAY ROOM TO ANNEX: (NEW) RR-801-P

3) REPAIR ALL FIRE BARRIER PENETRATION BREECHES PER M-56.3 TO EXISTING CONDITION.

4) CONDUITS THAT GO INTO RELAY ROOM REQUIRE INTERNAL KAOWOOL SEAL TO MINIMIZE POTENTIAL HALON LEAKAGE.

ROCHESTER GAS AND ELECTRIC CORP. - GINNA STATION CIRCUIT SCHEDULE

Page: 1 of 1 **Date:** 01/05/04 **Rev.:** A **Circuit No.:** C5620

Prepared: _____ Reviewed: _____ Approved: _____

Project : CREATS ELECTRICAL
Job No. : PCR 2003-0037
Other : Attachment 4
Misc. :

Date	Status	Engr.
1/9/04	CONSTRUCTION	

Conductors

No. of Cables	No. of Cond.	Cable Size	Shield	Operating Voltage	Cable Rating	BOM / PO#	Cable Length
2	1/C	8 AWG	NONE	480	600	MID5003465	15

Conduit(s)

Size	Length
1	10

Cable Routing

C5620

Work Group / QC Verification and Validation

Reel No.	Cut Length	QC Cable	QC Pull	QC Conduit	QC Tag

Nature of Circuit: *P 480 VAC POWER*

Division: A - TRAIN A

3 Phase: NO

Maintained Spacing: YES

Appendix R Safe Shutdown: NO

Safety Classification: SAFETY CLASS-3

From Equip : MCCN/1K / M
From Desc : MCCN POSITION 1K / M
From Drawing: PCR ATTACHMENT 5

To Equip : PXCB008
To Desc : CREATS TRANSFORMER A 480/120
To Drawing : PCR ATTACHMENT 5

Term Block	Term No.	Wire Mark	Base / Trace Color	Cont. WG QC	Megger COND SHD QC	From WG QC	To WG QC	Term Block	Term No.
1K / M	L1	L1						PRI	H1
1K / M	L2	L2						PRI	H4

NOTES:

ADDITIONAL REFERENCE DRAWINGS:

Elementary:
Other Dwg. 1:
Other Dwg. 2:
Other Dwg. 3:

Inst. / Tool I.D. Numbers:

Approval:

WG Supervisor (s) Date (s) QC Supervisor (s) Date (s)

WG / QC Remarks:

ROCHESTER GAS AND ELECTRIC CORP. - GINNA STATION CIRCUIT SCHEDULE

Page: 1 of 1 **Date:** 01/05/04 **Rev.:** A **Circuit No.:** C5621

Prepared: T Blackman Reviewed: R S M Dipt Approved: T. Mille

Project : CREATS ELECTRICAL
Job No. : PCR 2003-0037
Other : Attachment 4
Misc. :

Date	Status	Engr.
1/9/04	CONSTRUCTION	RD

Conductors

No. of Cables	No. of Cond.	Cable Size	Shield	Operating Voltage	Cable Rating	BOM / PO#	Cable Length
2	1/C	8 AWG	NONE	480	600	MID5003465	15

Conduit(s)

Size	Length
1	12

Cable Routing

C5621

Work Group / QC Verification and Validation

Reel No.	Cut Length	QC Cable	QC Pull	QC Conduit	QC Tag

Nature of Circuit: *P 480 VAC POWER*

Division: B - TRAIN B

3 Phase: NO
Maintained Spacing: YES

Appendix R Safe Shutdown: NO
Safety Classification: SAFETY CLASS-3

From Equip : MCCP/1M
From Desc : MCCP POSITION 1M
From Drawing: PCR ATTACHMENT 5

To Equip : PXCB009
To Desc : CREATS TRANSFORMER B 480/120
To Drawing : PCR ATTACHMENT 5

Term Block	Term No.	Wire Mark	Base / Trace Color	Cont. WG QC	Megger COND SHD QC	From WG QC	To WG QC	Term Block	Term No.
1M	L1	L1						PRI	H1
1M	L2	L2						PRI	H4

NOTES:

ADDITIONAL REFERENCE DRAWINGS:

Elementary:
Other Dwg. 1:
Other Dwg. 2:
Other Dwg. 3.

Inst. / Tool I.D. Numbers:

Approval:

WG Supervisor (s) Date (s) QC Supervisor (s) Date (s)

WG / QC Remarks:

ROCHESTER GAS AND ELECTRIC CORP. - GINNA STATION CIRCUIT SCHEDULE

 Date: 01/05/04 Rev.: A Circuit No.: C5622

Prepared: [signature] Reviewed: [signature] Approved: [signature]

Project : CREATS ELECTRICAL
Job No. : PCR 2003-0037
Other : Attachment 4
Misc. :

Date	Status	Engr.
1/9/04	CONSTRUCTION	[initials]

Conductors

No. of Cables	No. of Cond.	Cable Size	Shield	Operating Voltage	Cable Rating	BOM / PO#	Cable Length
3	1/C	8 AWG	NONE	120	600	MID5003465	3

Conduit(s)

Size	Length
1	1

Cable Routing

C5622

Work Group / QC Verification and Validation

Reel No.	Cut Length	QC Cable	QC Pull	QC Conduit	QC Tag

Nature of Circuit: *P 480 VAC POWER*

Division: A - TRAIN A

3 Phase: NO
Maintained Spacing: YES

Appendix R Safe Shutdown: NO
Safety Classification: SAFETY CLASS-3

From Equip : PXCB008
From Desc : CREATS TRANSFORMER A 480/120
From Drawing: PCR ATTACHMENT 5

To Equip : ACPDPCB11
To Desc : AC PANEL CB11
To Drawing : PCR ATTACHMENT 5

Term Block	Term No.	Wire Mark	Base / Trace Color	Cont. WG	Cont. QC	Megger COND	Megger SHD	Megger QC	From WG	From QC	To WG	To QC	Term Block	Term No.
SEC	X1	X1	BLACK										BUS	LINE 1
SEC	X4	X4	BLACK										BUS	LINE 2
SEC	X3	X3	BLACK										BUS	N

NOTES:

ADDITIONAL REFERENCE DRAWINGS:

Elementary:
Other Dwg. 2:
Other Dwg 1:
Other Dwg. 3.

Inst. / Tool I.D. Numbers:

Approval:

WG Supervisor (s) Date (s) QC Supervisor (s) Date (s)

WG / QC Remarks:

ROCHESTER GAS AND ELECTRIC CORP. - GINNA STATION CIRCUIT SCHEDULE

Page: 1 of 1 | Date: 01/05/04 | Rev.: A | Circuit No.: C5623

Prepared: T.E. Cashman Reviewed: R.D. Swift Approved: T. Mottin

Project : CREATS ELECTRICAL
Job No. : PCR 2003-0037
Other :
Misc. : Attachment 4

Date	Status	Engr.
1/9/01	CONSTRUCTION	PS

Conductors

No. of Cables	No. of Cond.	Cable Size	Shield	Operating Voltage	Cable Rating	BOM / PO#	Cable Length
3	1/C	8 AWG	NONE	120	600	MID5003465	6

Conduit(s)

Size	Length
1	4

Cable Routing

C5623

Work Group / QC Verification and Validation

Reel No.	Cut Length	QC Cable	QC Pull	QC Conduit	QC Tag

Nature of Circuit: *P 480 VAC POWER*

Division: B - TRAIN B

3 Phase: NO

Maintained Spacing: YES

Appendix R Safe Shutdown: NO

Safety Classification: SAFETY CLASS-3

From Equip : PXCB009
From Desc : CREATS TRANSFORMER B 480/120
From Drawing: PCR ATTACHMENT 5

To Equip : ACPDPCB12
To Desc : AC PANEL CB12
To Drawing : PCR ATTACHMENT 5

Term Block	Term No.	Wire Mark	Base / Trace Color	Cont. WG	Cont. QC	Megger COND	Megger SHD	Megger QC	From WG	From QC	To WG	To QC	Term Block	Term No.
SEC	X1	X1	BLACK										BUS	LINE 1
SEC	X4	X4	BLACK										BUS	LINE 2
SEC	X3	X3	BLACK										BUS	N

NOTES:

ADDITIONAL REFERENCE DRAWINGS:

Elementary:
Other Dwg. 1:
Other Dwg. 2:
Other Dwg. 3.

Inst. / Tool I.D. Numbers

Approval:

WG Supervisor (s) Date (s) QC Supervisor (s) Date (s)

WG / QC Remarks:

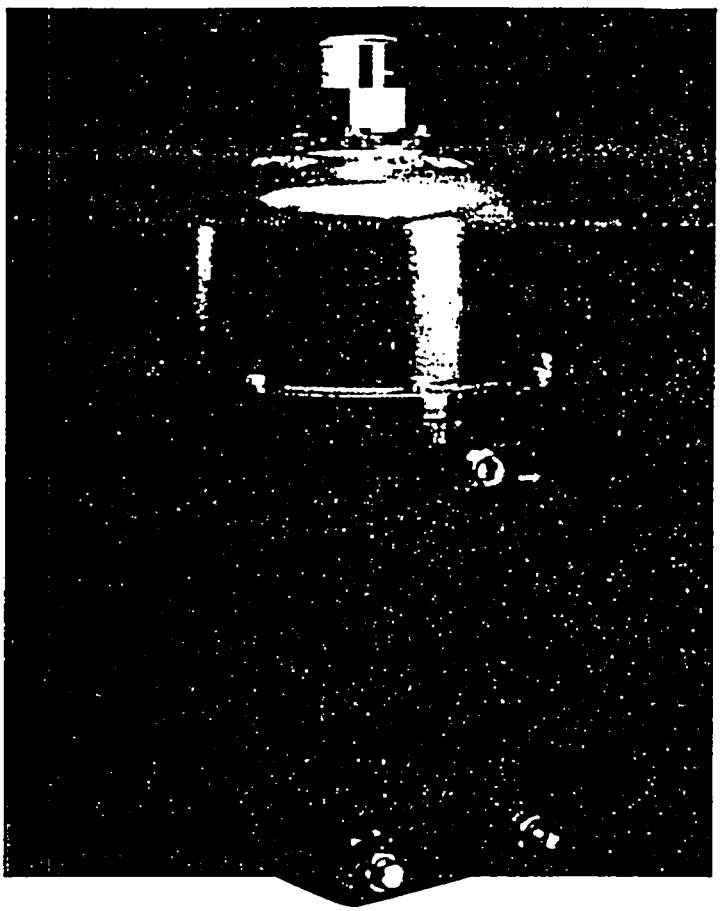
RCS®

TEXSTEAM INC.

SERIES SURE 100

Electripowr™ Type-SR

1200 Inch Pound Torque Output



The SURE 100 is the largest and latest model of the RCS Surepowr Series Spring Return Electric Actuators. This newly-developed product incorporates the most advanced high-tech research and design, yet it uses a simple concept—a torsion power spring which provides dependable mechanical force for actuation when electrical power is lost. The Sure 100 torque capability is ideally suited for industrial-grade dampers and rotary valves when emergency shutdown is required.

This model is available in two speeds for two position (open/close) control as well as modulating control service. The Sure 100 enclosure complies with NEMA 4, 7 and 9 requirements and is available with either clockwise or counterclockwise power spring drive. CSA certification is in progress.

Applications

- Safety shutdown for automated and computer-controlled systems
- Used where emergency shutdown is required in critical valve applications, such as 6" and 8" butterfly valves, 2" and 3" ball and/or plug valves
  - Process control systems, all types
  - Vapor recovery systems
  - Tank truck loading stations
- For fast and accurate closure of dampers in air systems that require reliable emergency operation
  - Vehicle tunnel and subway station smoke exhaust systems
  - Power plant coal dust collecting systems
  - Air intake and exhaust ventilation systems for electric utilities
  - Isolation dampers for air handling systems in energy plants
  - Dryer systems
- Used in combination with RCS Digi-Line™ Solid State Positioners to perform a wide range of precision control functions
- Will automate power switches and safety devices

Features

- Powered by a rugged, high-torque, integral, 115 Vac/220 Vac 50/60 Hz, single phase, reversible motor
- Precision-cut gears and shafts are heat-treated high alloy steel
- High visibility position indicator
- Designed for intermittent and modulating service as typified by applications which require emergency operation to a pre-determined position
- Unique micro-adjustment plates permit fast, accurate setting of travel limit switches when needed. Switch activating cams are independently adjustable throughout the actuator's 90° rotation for maximum setting flexibility and accuracy.
  - Built-in motor overload protection
  - Permanent high grade lubrication
  - Gear train designed to withstand stall torque
  - Operates in any attitude or position
- Accessible, clearly-marked integral terminal strip assures fast, easy field wiring
- Two ¾" NPT conduit entries
- Adjustable end-of-travel stops
- ISO 5211 mounting dimensions
- Electroless nickel plated output configurations provide maximum corrosion protection

Advantages

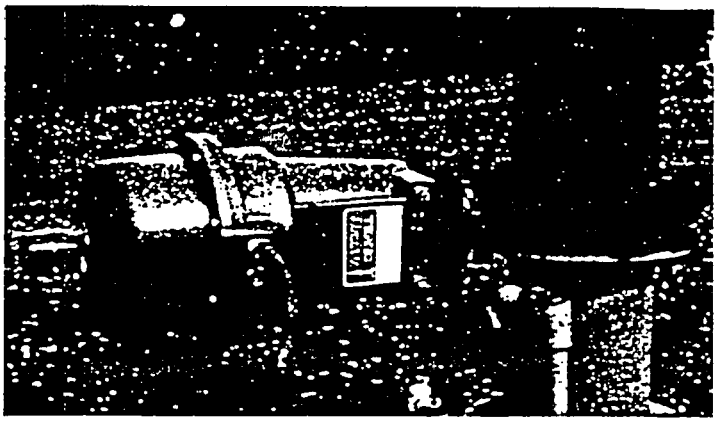
- More compact. Lighter than other fail-safe electric actuators
- No messy leaks from hydraulic fluids
  - Power drive is electric or mechanical
- Easy, low cost installations
  - Connects to standard 2-wire, 115 Vac, 50/60 Hz, 1Ph power line
  - No air or hydraulic lines required
- Low maintenance and energy costs
  - Gear train is permanently lubricated at the factory for the life of the actuator
  - Brake gap is set at the factory. No adjustment is required.
  - No pumps, compressors or troublesome hoses and tubing
  - Requires less electrical power than pneumatic and hydraulic systems
  - No scheduled maintenance required as with some battery packs
- No speed or power loss due to cold temperatures which affect fluid and battery power
- Combination NEMA 4 and 7 housing
  - Water tight/weather-proof seal makes enclosure suitable for NEMA 4 indoor/outdoor installations
  - Can be used in explosion-proof applications where battery packs could be hazardous
- CSA and ISO 9001 certification in progress

Optional Features

- Integral potentiometer; 1,000 OHM, 2 watts, 1% linearity. Other resistances available.
- Auxiliary function switches
- Heaters with thermostats, breathers and drains, special corrosion-resistant coatings
- Modulating service for 30 second speed at 50% duty cycle
- Remote position feedback available as analog or resistance signals
- High temperature modification for special applications

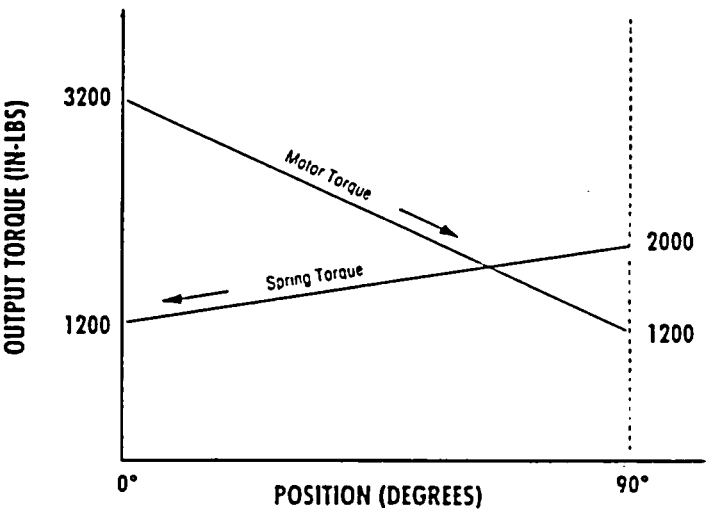
Specifications

		Sure 100	
Speed Per 90° in Seconds	Electric Mode	10	30
	Spring Return	5	7
Torque Output Inch Pounds		1,200	1,200
Motor Current L.R. @ 120 Vac		2.8A	.71A
Current Draw Solenoid Brake		.04A	.04A



SURE 100 actuator in typical butterfly valve application.

SURE 100 ACTUATOR Output Torque



Voltage: 115 Vac/220 Vac, 50/60 Hz, 1 Ph—standard

Duty Cycle: 25% for 10 second unit
50% for 30 second unit

Enclosure: Meets all of the following in a single enclosure:
Type 4, water tight indoor and outdoor locations;
Type 7, explosion-proof, Class I, Groups C&D, hazardous locations;
Type 9, dust ignition proof, Class II, Groups E,F&G, hazardous locations.

Ambient Temperature: -40°F to +150°F. Optional heaters are recommended below 32°F ambient or in outdoor installations.

Limit Switches: 15 Amps resistive load at 115 Vac

Lubrication: High grade gear grease, permanently lubricated. Self-lubricating bearings.

Mounting: ISO 5211

Conduit Entry: 2 - ¾" NPT provided

Output Torque: 1,200 inch pounds

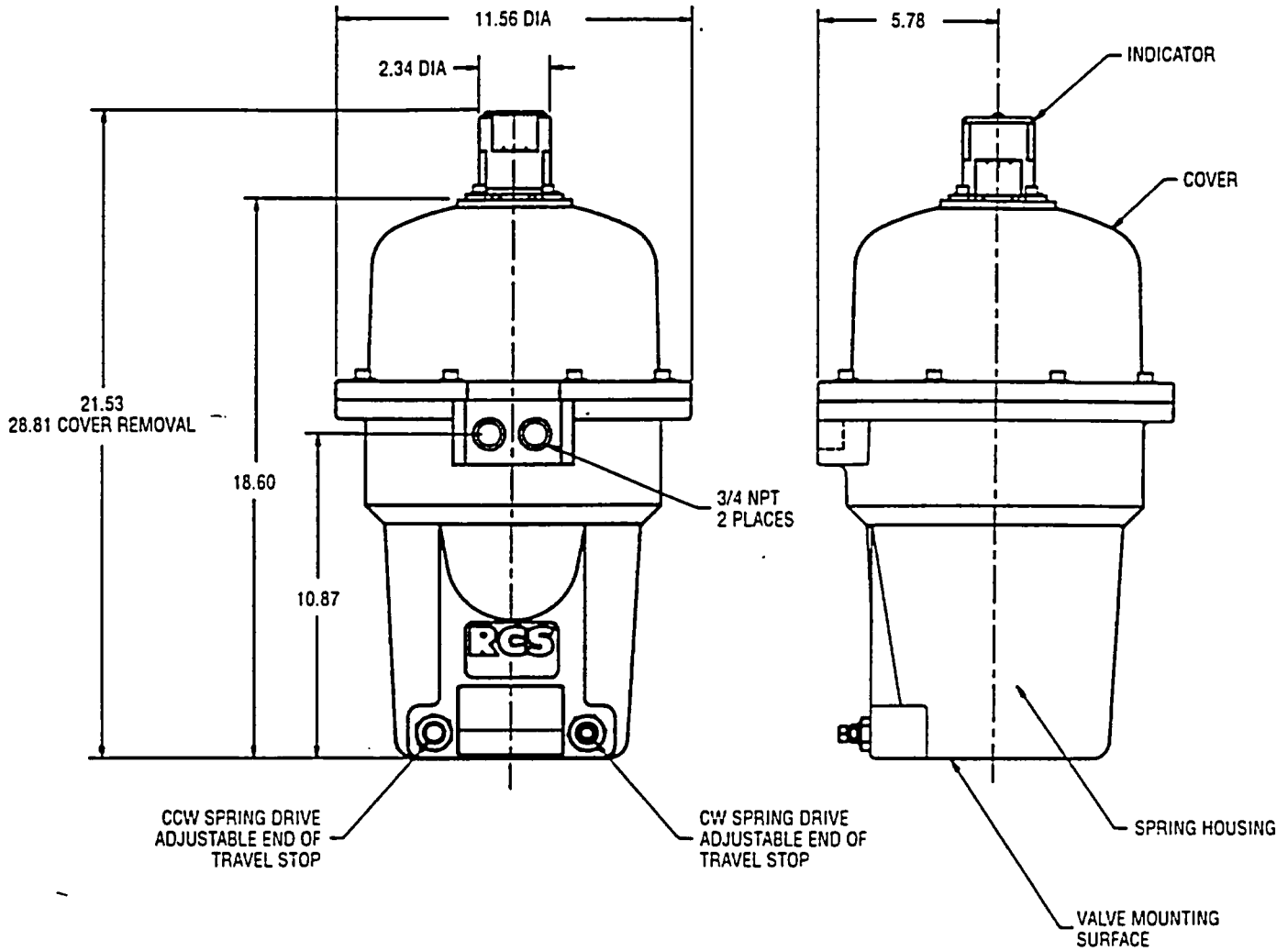
Rotation: CW or CCW for spring return

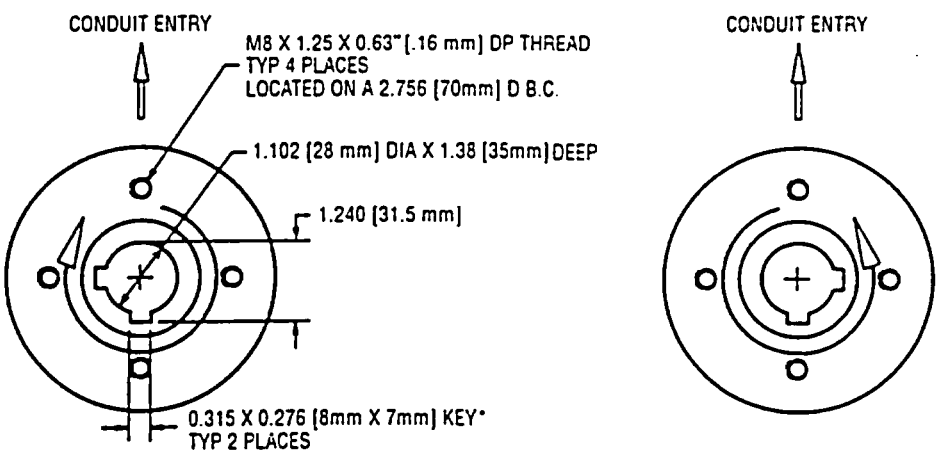
Weight: 70 pounds

Limit Switches:

Models MA-8 and MAR-8; 5 A rated at 125 Vac and 250 Vac UL listed.
All other Models UL and CSA listed:
15 A and ½ hp, 125 or 250 Vac;
½ A, 125 Vdc; ¼ A, 250 Vdc;
5 A, 120 Vac "L" (lamp load).

SURE 100
Dimensional Information





CCW SPRING RETURN

CW SPRING RETURN

BOTTOM VIEW

Notes:

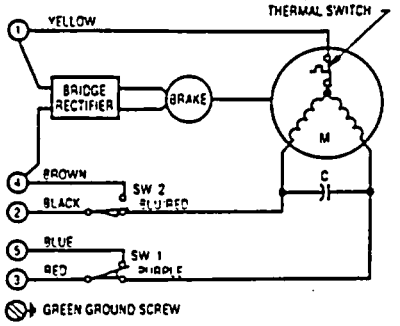
1. Direction of rotation is based on viewing actuator from top.
2. Actuator shown in power fail position.
3. Mounting dimensions comply with ISO 5211 flange type F07.
* 4. Two keys are recommended for driving device.

DWG. NO. 90-853

WIRING DIAGRAMS

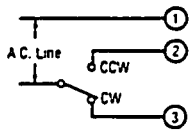
SPRING DRIVE CW ON LOSS OF POWER

ACTUATOR WIRING



FIELD WIRING

Motor Drive CW & CCW. Spring Drive CW on Loss of Power.



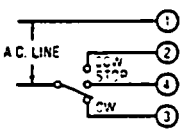
SPDT Snap Action Switch

Power to ② will motor drive and brake hold actuator in CCW most position.

Power to ③ will motor drive and spring hold actuator in CW most position.

Loss of power will spring drive and spring hold actuator in CW most position.

Motor Drive CW & CCW. Intermediate Stop Capability. Spring Drive CW on Loss of Power.



SP-3 Position Snap Action Switch

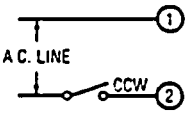
Power to ② will motor drive and brake hold actuator in CCW most position.

Power to ④ will brake hold actuator in whatever position it is in at the time.

Power to ③ will motor drive and spring hold actuator in CW most position.

Loss of power will spring drive and spring hold actuator in CW most position.

Motor Drive CCW. Spring Drive CW on Loss of Power.



SPST Switch

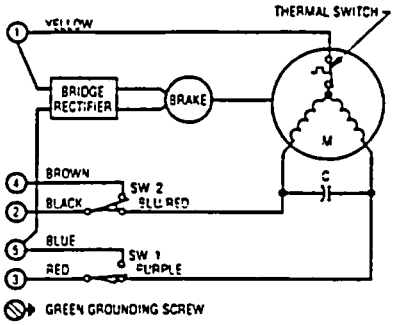
Power to ② will motor drive and brake hold actuator in CCW most position.

Loss of power will spring drive and spring hold actuator in CW most position.

WD-101-914

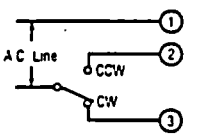
SPRING DRIVE CCW ON LOSS OF POWER

ACTUATOR WIRING



FIELD WIRING

Motor Drive CW & CCW. Spring Drive CCW on Loss of Power.



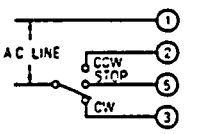
SPDT Snap Action Switch

Power to ③ will motor drive and brake hold actuator in CW most position.

Power to ② will motor drive and spring hold actuator in CCW most position.

Loss of power will spring drive and spring hold actuator in CCW most position.

Motor Drive CW & CCW. Intermediate Stop Capability. Spring Drive CCW on Loss of Power.



SP-3 Position Snap Action Switch

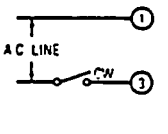
Power to ③ will motor drive and brake hold actuator in CW most position.

Power to ⑤ will brake hold actuator in whatever position it is in at the time.

Power to ② will motor drive and spring hold actuator in CCW most position.

Loss of power will spring drive and spring hold actuator in CCW most position.

Motor Drive CW. Spring Drive CCW on Loss of Power.



SPST Switch

Power to ③ will motor drive and brake hold actuator in CW most position.

Loss of power will spring drive and spring hold actuator in CCW most position.

WD 101-915

IMPORTANT: DIRECTION OF ROTATION IS BASED ON VIEWING ACTUATOR FROM TOP.
TO OPERATE MULTIPLE ACTUATORS IN PARALLEL FROM A SINGLE SIGNAL REQUIRES ISOLATING RELAYS IN THE FIELD WIRING.

Operation:

POWER ON: The electric motor drives the gear train, which in turn winds the spring and turns the device. An internal limit switch de-energizes the motor and energizes the brake, which holds the return spring and device in position.

POWER OFF: When the current is interupted by either a control signal or a power failure, the return spring drives the device to its original position.

Note: It is recommended that the actuator be driven electrically in both directions for normal operation to prolong cycle life.

Bulletin No. 6004
1034-5M-4.94

TEXSTEAM INC.
1020 Rankin Rd., Houston, TX 77073
P.O. Box 60706, Houston, TX 77205
TEL: (713) 443-7000
FAX: (713) 443-6308
FAX: (713) 443-4802

TYPE SURE 100

SUREPOWR™ ACTUATOR FIELD INSTALLATION INSTRUCTIONS

SAFETY FIRST

In the maintenance and operation of mechanical equipment, SAFETY is the basic factor which must be considered at all times. Through the use of the proper clothes, tools and methods of handling, serious accidents causing injury to you or your fellow worker can be prevented.

Throughout this manual are listed a number of safety precautions. Study them carefully and follow them; also insist upon those working for you do the same. Remember, an accident is usually caused by someone's carelessness, neglect or oversight.

CAUTION	To prevent ignition of hazardous atmospheres, do not remove actuator cover while circuits are live.	CAUTION
CAUTION	Loaded spring inside actuator. Do not attempt to repair actuator below top gear plate, unless properly trained on repair methods.	CAUTION

INSTALLATION

1. Operate device manually before installing actuator and orient into the same position as actuator spring would drive.
2. If device is equipped with mechanical position stops they should be removed, but care should be taken not to damage or remove necessary parts.
3. Care should be taken to maintain proper alignment between the actuator and device shaft. If actuator is not in correct alignment with the device shaft, repeat operation number one (1) with correction as required.
4. Mount the actuator to the device. Tighten all bolts and nuts evenly, taking care to center the actuator on the drive shaft or stem. It is often a good idea to cycle the actuator while the mounting bolts are somewhat loose. This will allow the unit to center itself.
5. Remove the cover bolts located about the control cover flange of the actuator.
6. Wire per diagram, or if actuator is of special design, wiring diagram is included with unit. Use #18AWG stranded wire or better, for field hook-up.
7. ***Special Note:*** *All Surepowr models can be factory built for clockwise or counter-clockwise spring drive rotation, as viewed from top of actuator. Extra care is advised to insure correct wiring diagram/actuator use.*
8. Run unit from one extreme to the other several times.
9. Cam adjustments (if required), as follows:

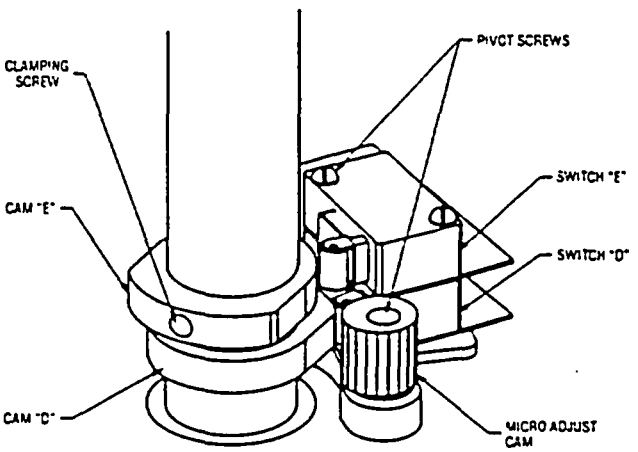
To set open travel by adjusting cams:

(a) Loosen clamping screw on cam "E" to give the cam a finger tight grip on shaft, rotate cam clockwise away from switch.

(b) Manually operate device to the proper "open" position.

(c) Rotate cam "E" counter-clockwise against switch roller until switch just "breaks". You should hear a light clicking.

(d) Tighten clamping screw. If travel is not correct, repeat steps (a), (b) and (c), or use the micro-adjustment cam.



To set close travel by adjusting stop screw and cam:

(a) Loosen clamping screw on cam "D" to give the cam a finger tight grip on shaft, rotate cam counter-clockwise away from the switch.

(b) With power off, adjust shaft close position with end of travel stop on outside bottom of actuator.

(c) Rotate cam "D" clockwise against switch roller until switch just "breaks". You should hear a light clicking.

(d) Tighten clamping screw. If travel is not correct, repeat steps (a), (b) and (c), or use the micro-adjustment cam.

CAUTION To prevent ignition of hazardous atmospheres, do not remove actuator cover while circuits are live. **CAUTION**

Note: In the event that the above procedure does not give the necessary travel control, the micro-adjustment cam has to be repositioned as follows:

To set travel by adjusting switch plate:

(a) Loosen pivot and micro-adjustment screws.

(b) In the event of actuator under travel, rotate micro-adjustment cam to swing switch outward from the cam post.

(c) In the event of actuator over-travel, swing switch into cam post.

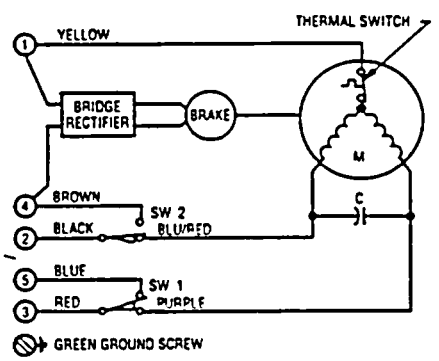
(d) Tighten pivot and micro-adjustment screws.

Note: Adjusting the switch plate will move the "motor side" end of the travel position only. The "spring return side" position is controlled by the travel stop on the bottom of the actuator.

10. Replace cover and tighten all flange bolts.
11. Unit is now ready for automatic operation.

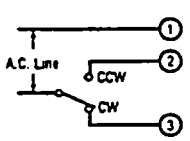
WIRING DIAGRAMS

SPRING DRIVE CW ON LOSS OF POWER ACTUATOR WIRING



FIELD WIRING

Motor Drive CW & CCW. Spring Drive CW on Loss of Power.



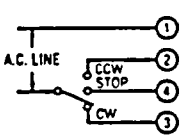
SPDT Snap Action Switch

Power to ② will motor drive and brake hold actuator in CCW most position.

Power to ① will motor drive and spring hold actuator in CW most position.

Loss of power will spring drive and spring hold actuator in CW most position.

Motor Drive CW & CCW. Intermediate Stop Capability. Spring Drive CW on Loss of Power.



SP-3 Position Snap Action Switch

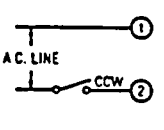
Power to ② will motor drive and brake hold actuator in CCW most position.

Power to ④ will brake hold actuator in whatever position it is in at the time.

Power ① will motor drive and spring hold actuator in CW most position.

Loss of power will spring drive and spring hold actuator in CW most position.

Motor Drive CCW. Spring Drive CW on Loss of Power.



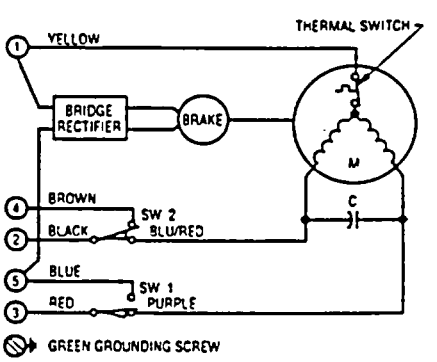
SPST Switch

Power to ② will motor drive and brake hold actuator in CCW most position.

Loss of power will spring drive and spring hold actuator in CW most position.

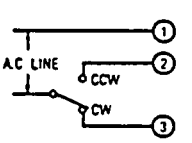
WD 101-914

SPRING DRIVE CCW ON LOSS OF POWER ACTUATOR WIRING



FIELD WIRING

Motor Drive CW & CCW. Spring Drive CCW on Loss of Power.



SPDT Snap Action Switch

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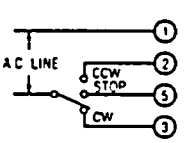
Motor Drive CW & CCW. Intermediate Stop Capability. Spring Drive CCW on Loss of Power.



SP-3 Position Snap Action Switch

Power to ① will motor drive and brake hold actuator in CW most position.

Power to ⑤ will brake hold actuator in whatever position it is in at the time.

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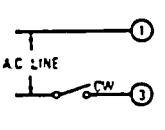
Motor Drive CW. Spring Drive CCW on Loss of Power.



SPST Switch

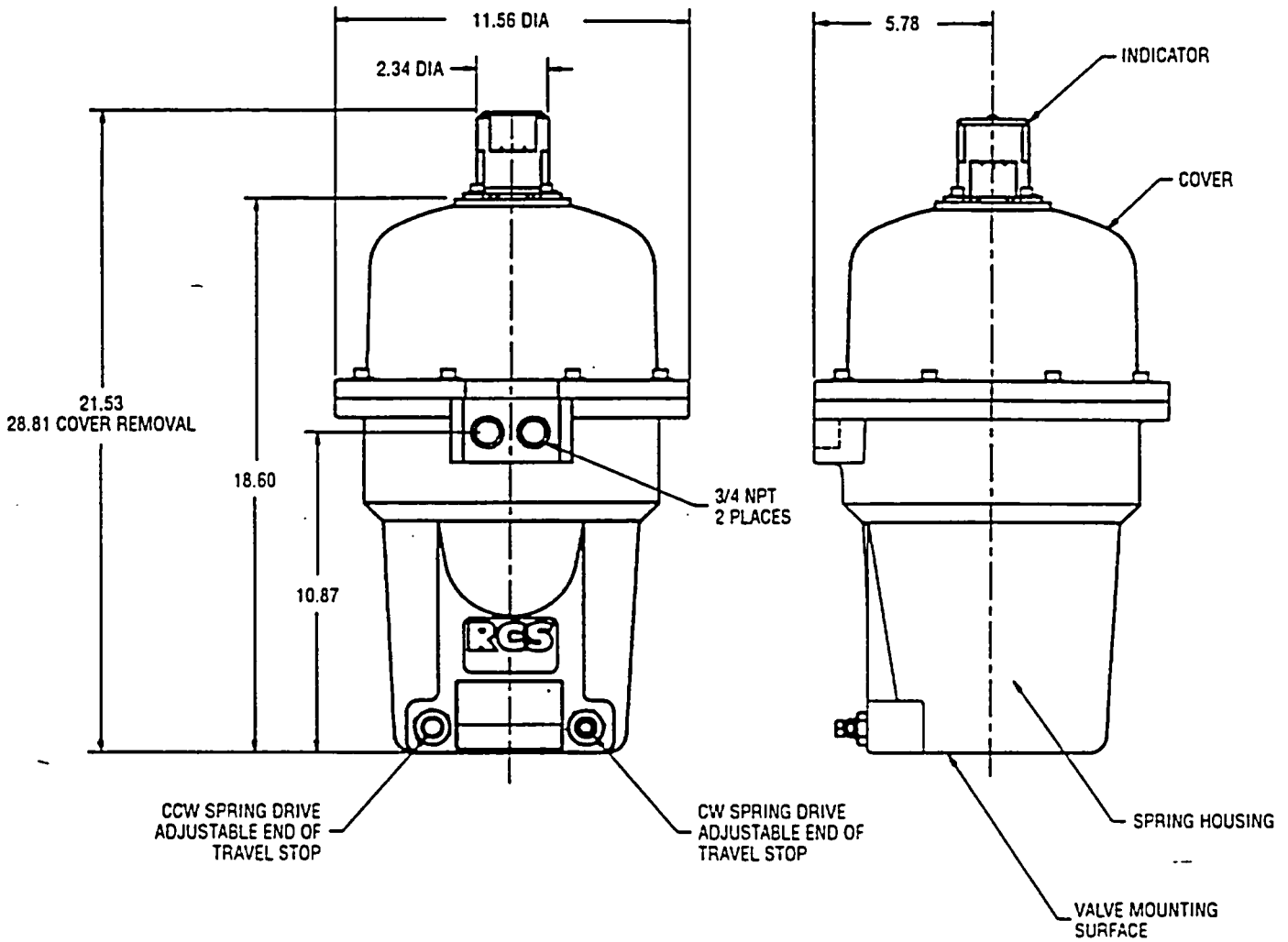
Power to ① will motor drive and brake hold actuator in CW most position.

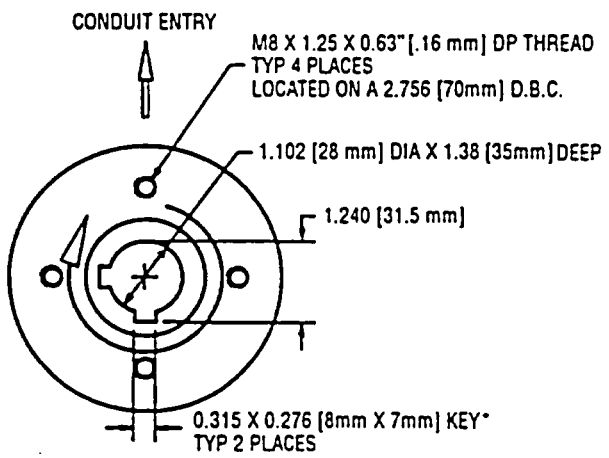
Loss of power will spring drive and spring hold actuator in CCW most position.

WD 101-915

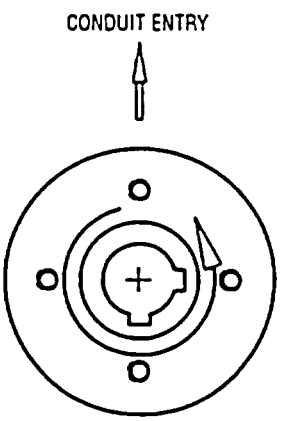
IMPORTANT: DIRECTION OF ROTATION IS BASED ON VIEWING ACTUATOR FROM TOP.
TO OPERATE MULTIPLE ACTUATORS IN PARALLEL FROM A SINGLE SIGNAL REQUIRES ISOLATING RELAYS IN THE FIELD WIRING.

SURE 100 — NEMA 4 & 7 Dimensional Information





CCW SPRING RETURN



CW SPRING RETURN

BOTTOM VIEW

NOTES:

1. Direction of rotation is based on viewing actuator from top.
2. Actuator shown in power fail position.
3. Mounting dimensions comply with **ISO 5211** flange type F07.
4. *Two keys are recommended for driving device.

DWG. NO. 90-853

OPERATION:

POWER ON: The electric motor drives the gear train, which in turn winds the spring and turns the device. An internal limit switch de-energizes the motor and energizes the brake, which holds the return spring and device in position.

POWER OFF: When the current is interrupted by either a control signal or a power failure, the return spring drives the device to its original position.

Note: It is recommended that the actuator be driven electrically in both directions for normal operation to prolong cycle life.

MAINTENANCE

Gear train is permanently lubricated at the factory for the average life of the actuator. Brake gap is set at the factory. No further attention is required.

THERMAL OVERLOAD

The internal thermal overload switch de-energizes the motor and prevents overheating of the motor windings due to excessive operation, stalling or high ambient temperatures.

DUTY CYCLE

The maximum duty-cycle to be expected without interruption by thermal cut-off at an ambient temperature of 150° F is 25%, (3 "OFF" times for every 1 "ON" time), for the 10 second design, and 50%, (1 "OFF" time for every 1 "ON" time), for the 30 second design.

STORAGE

The Surepowr actuator must be stored in a clean, dry, temperature controlled building which is protected from the weather. Precautions shall be taken to prevent condensation inside or outside the actuator. If there is insufficient external temperature and humidity control, internal heaters must be installed and energized to protect the unit against condensation from extreme temperature variations. The actuators shall be stored off the floor on suitable pallets and must be covered with an unsealed dust protector allowing side and bottom ventilation.

TROUBLESHOOTING

Note: Most actuator problems occur due to incorrect cam/travel limit switch setting, or the use of an external travel stop on the device that the actuator is operating.

Problem 1: **Actuator is receiving electric power but the motor does not respond.**

Instructions: 1a. Check actuator nameplate to insure correct model, voltage type and spring return direction.

1b. Check all wiring against installation wiring diagram.

1c. Measure live voltage to insure that actuator is receiving full rated voltage.

1d. Check cam/travel limit switch position to insure that motor control switch is not made and that the actuator is within its normal open-close rotation limits. This check can be made using a volt meter connected between one side of the incoming line (common) and one leg of the motor or capacitor. This check should show power between common and one leg only. Power at the common and both legs or no power at all, would indicate cam and or wiring adjustment(s) are required.

Problem 2: **Actuator is receiving electric power but the motor only hums.**

Instructions: 2a. Perform steps 1a through 1d listed above.

2b. Check to insure brake is completely disengaged when power is applied.

Problem 3: **Actuator runs but operation is erratic.**

Instructions: 3a. Perform steps 1a through 1d listed above.

3b. Check ambient temperature. Standard Surepowr actuators have a maximum ambient operating temperature rating of 150°F.

3c. Check duty cycle (frequency of operation). See above for details.

3d. Check to insure actuator is not running into a continuous stall condition.

Problem 4: **Motor runs continuously in spring return direction after actuator output shaft has stopped.**

Instructions: 4a. Adjust spring return side travel cam/switch so that the cam trips the switch before shaft stops motion.

Note: All Surepowr actuators are manufactured with built-in thermal overload motor protectors.

Should any of the above cause the protector to open, it will automatically reset when the motor temperature is lowered to a safe level.

LOCATING AND ORDERING PARTS

For ease and accuracy in identifying and ordering spare or replacement parts, submit the following information from unit nameplate.

1. Serial Number
2. Model number
3. Voltage

TEXSTEAM INC.

1020 Rankin Rd., Houston, TX 77073
P. O. Box 60706, Houston, TX 77205
TEL: (713) 443-7000
FAX: (713) 443-6308
FAX: (713) 443-4802

EGS-DP-927701-144
Revision 0
Attachment: 1 Part: 5
Page 9 of 10

TELECOPY TRANSMISSION

ENERGY VALVE DIVISION (DRESSER)
RCS & ANDCO ACTUATORS

Date:	January 8, 1997	Pages:	2
To:	Mike Simmons	Fax №	816-765-4147
From:	David Leese, Design Engineer 1020 Rankin Road (77073) PO Box 60706, Houston TX 77205 Phone: 281 443-7000 Fax: 281 443-7176		

Reference: Sure 100 with manual override.

At your request, I am forwarding drawing 90-857 showing the Sure100 with a manual override wormgear operator.

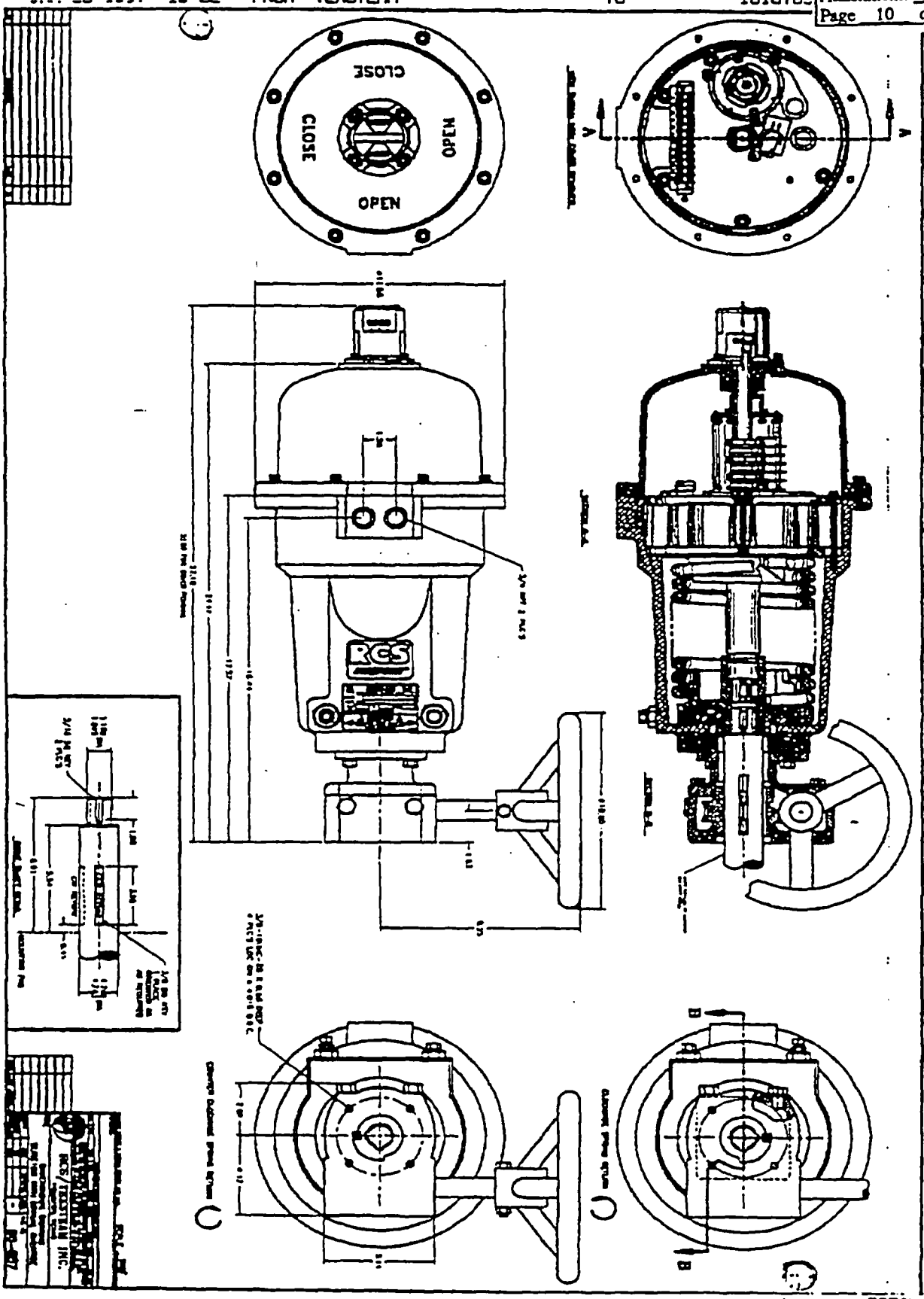
The arrangement shown allows the customer to manually override the Sure100 during power failure. The actuator can be manually overriden to any position between fully open and fully closed, and it will remain in that position until manually returned to fully closed. In other words, the actuator will spring return to the manual override position, not to its fail-safe position.

As an added note, the manual override will function only if the actuator is mounted to the valve. Without the spring in the Sure100, the manual override can be used to open the valve, not to close it. If your customer wants a manual override for control while the actuator is off of the valve for maintenance, then this arrangement will not work.

If you have any additional questions, please let me know.

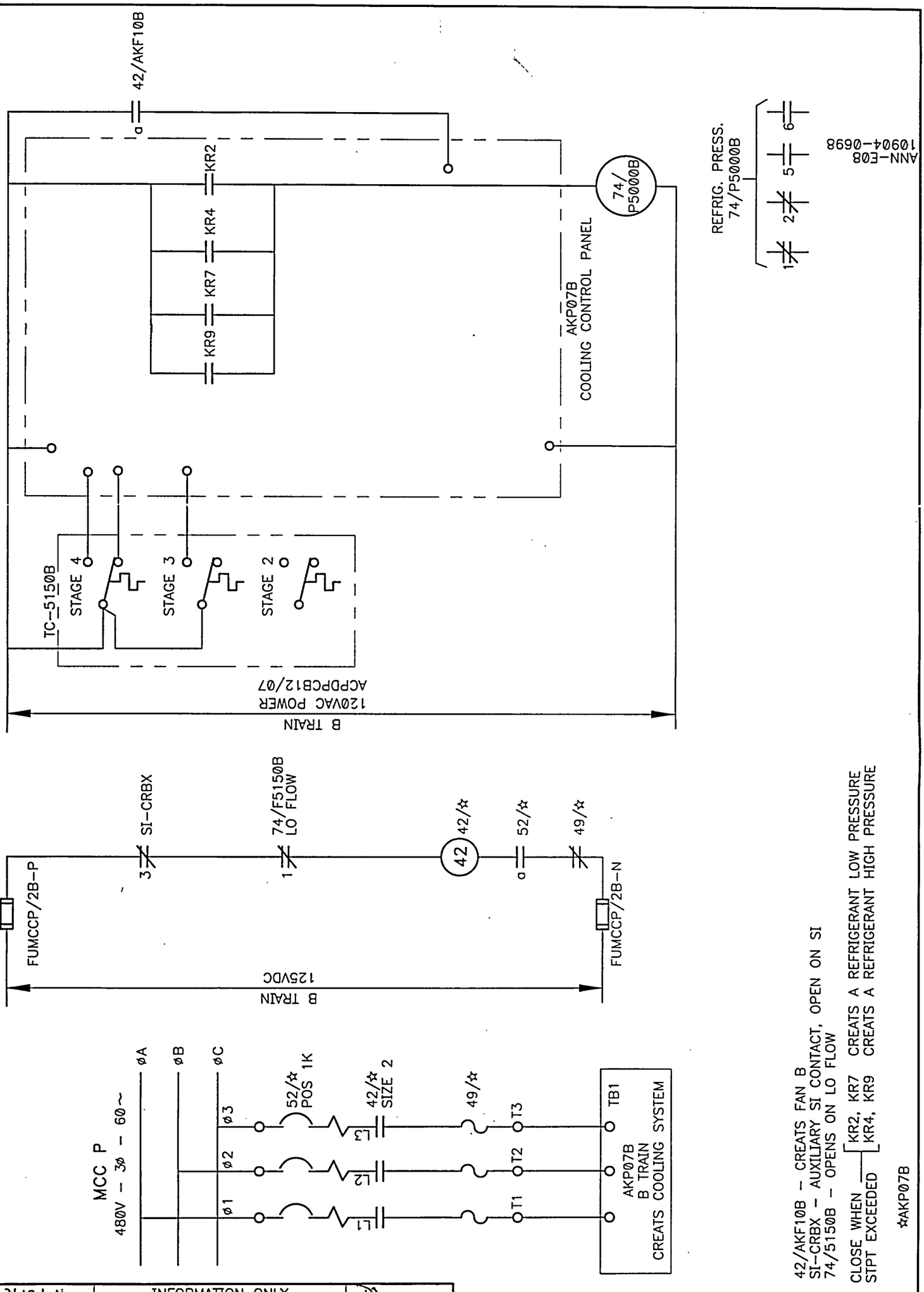
Regards,

David Leese


CLOSE
OPEN
CLOSE
OPEN
RCS

CREATS

ELEMENTARY WIRING DIAGRAMS



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FACILITY	GINNA				
SCALE	NONE	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
CAD FILENAME	SKEL0822B				

ELECTRICAL

MCC P POS. 1K
CREATS COOLING UNIT B
(AKP07B>
ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
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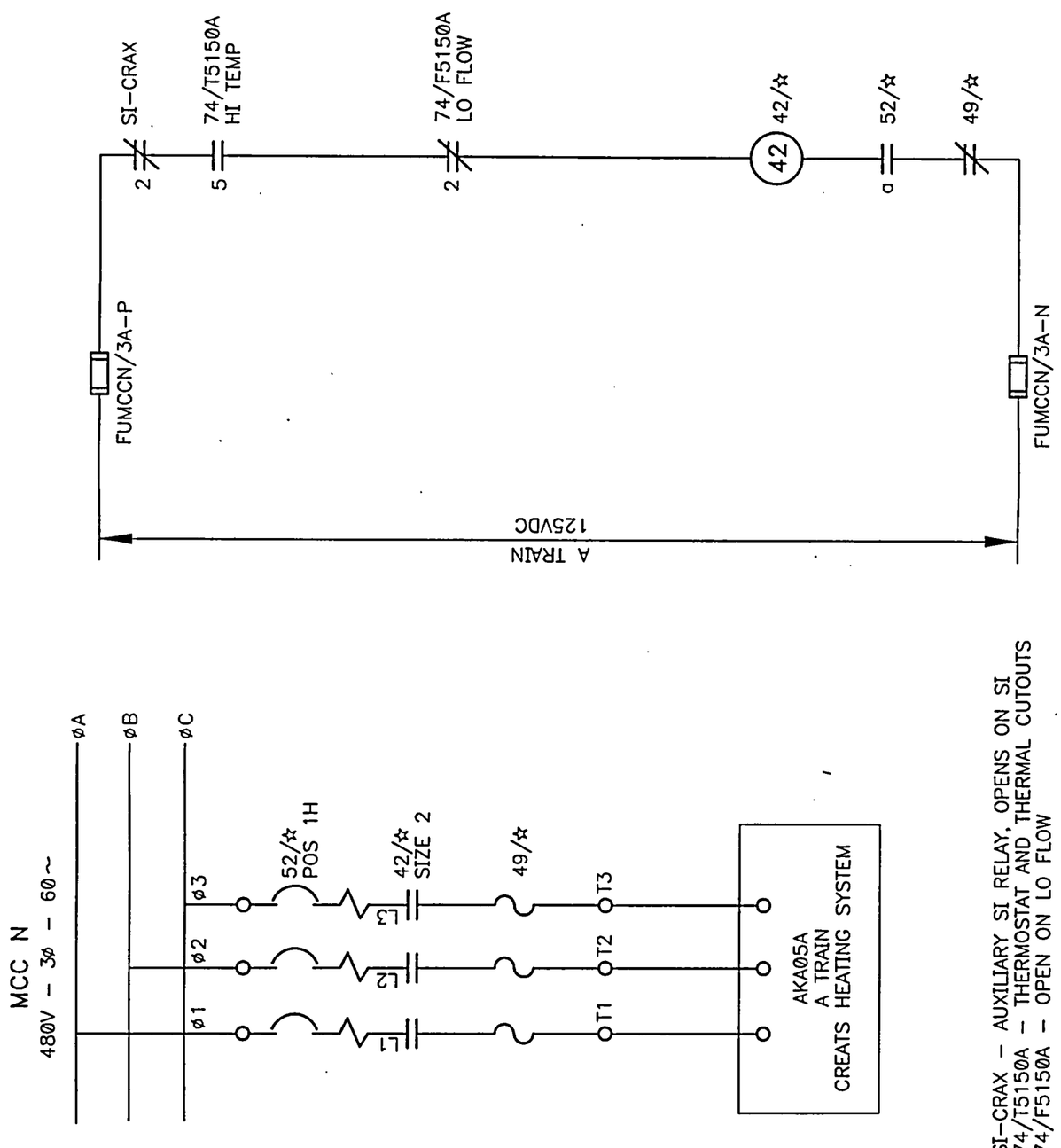

SI-CRAX - AUXILIARY SI RELAY, OPENS ON SI
74/T5150A - THERMOSTAT AND THERMAL CUTOUTS
74/F5150A - OPEN ON LO FLOW

☆AKA05A

2/13/04	INFORMATION ONLY.		PS		
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REV	REVISED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	NONE				
CAD FILENAME	SKEL0823A				

ELECTRICAL

MCC N POS. 1H
CREATS HEATING UNIT A
(AKA05A>
ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
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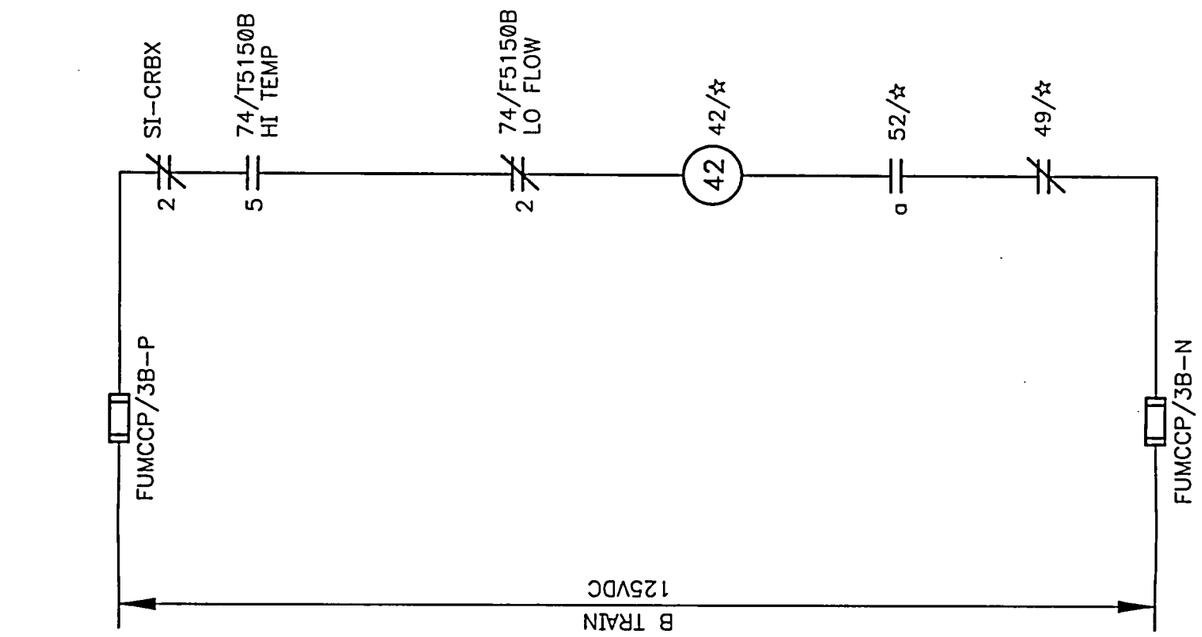

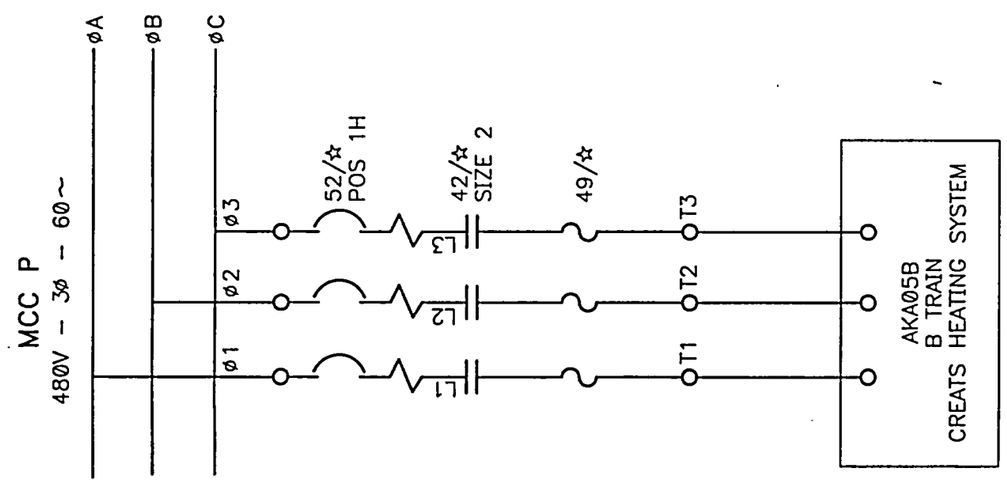

SI-CRBX - AUXILIARY SI RELAY, OPENS ON SI
74/T5150B - THERMOSTAT AND THERMAL CUTOUTS
74/F5150B - OPENS ON LO FLOW

☆AKA05B

2/13/04	INFORMATION ONLY			PS	
DATE	RELEASED FOR			ENGINEER	
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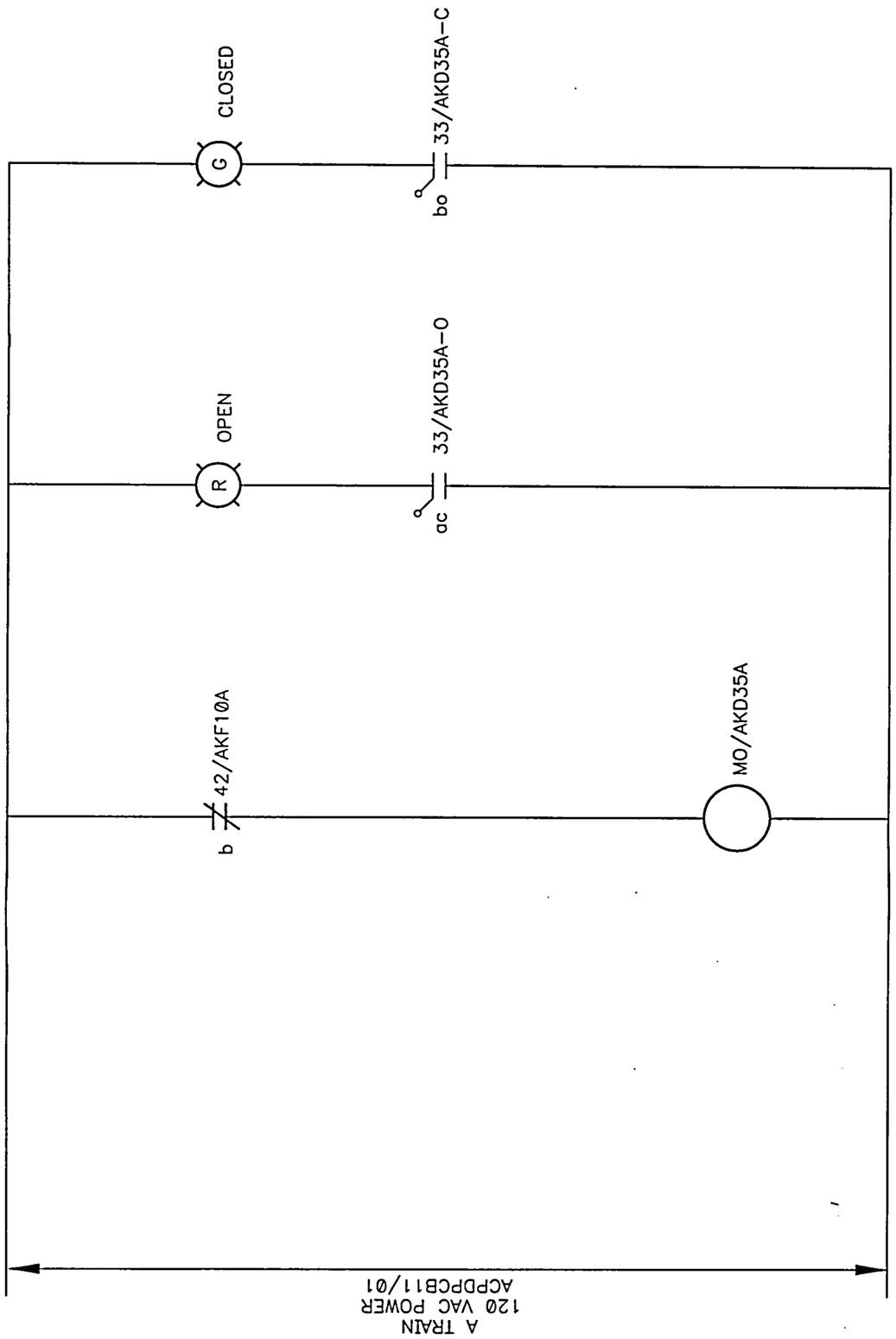
REV	REVISED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	NONE				
CAD FILENAME	SKEL00823B				

ELECTRICAL

MCC P POS. 1H
CREATS HEATING UNIT B
<AKA05B>
ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
PCR 2003-0037	SK10905-0823	2	0



DAMPER POSITION	OPEN	INTERM	CLOSED
LIMIT SWITCH ac		■	
LIMIT SWITCH bo			■
LIMIT SWITCH ao	■		
LIMIT SWITCH bc			■

■ N.O. CONTACTS CLOSED

NOTES:
AKD35A - DISCHARGE DAMPER - POWER TO CLOSE FAIL OPEN
42/AKF10A - CREATS FAN A

2/13/04	INFORMATION ONLY	PS
DATE	RELEASED FOR	ENGINEER

REV	REVISED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
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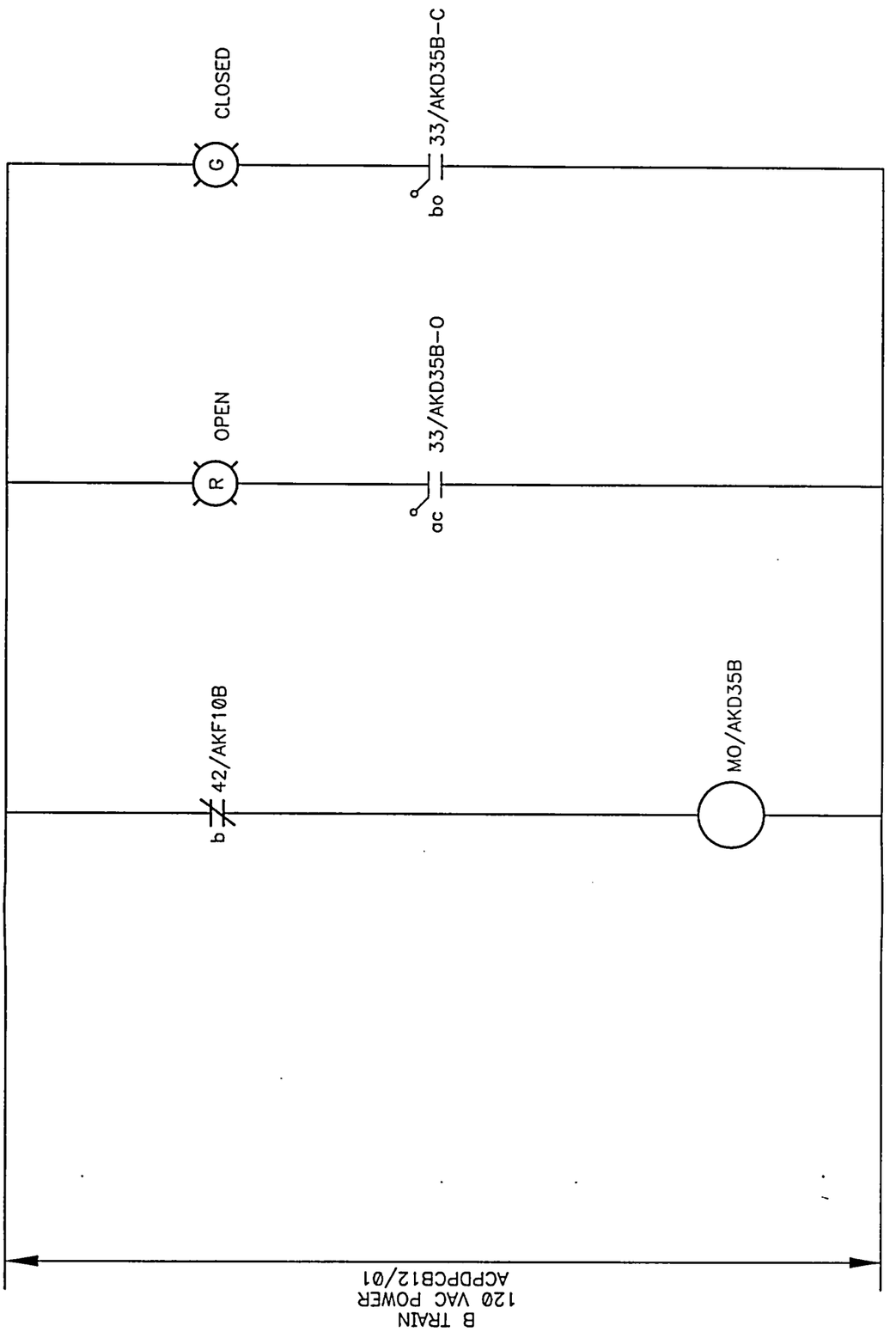
FACILITY	GINNA
SCALE	NONE
CAD FILENAME	SKEL0824A

ROCHESTER GAS & ELECTRIC CORP.
ROCHESTER, NEW YORK

ELECTRICAL

FAN A DISCHARGE DAMPER CREATS A TRAIN ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
PCR 2003-0037	SK10905-0824	1	0



DAMPER POSITION	OPEN	INTERM	CLOSED
LIMIT SWITCH ac	■		
LIMIT SWITCH bo		■	■
LIMIT SWITCH ao	■		
LIMIT SWITCH bc			■

■ N.O. CONTACTS CLOSED

NOTES:
AKD35B - DISCHARGE DAMPER - POWER TO CLOSE FAIL OPEN
42/AKF10B - CREATS FAN B

2/13/04	INFORMATION ONLY			PS	
DATE	RELEASED FOR			ENGINEER	
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FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	NONE				
CAD FILENAME	SKEL0824B				

ELECTRICAL

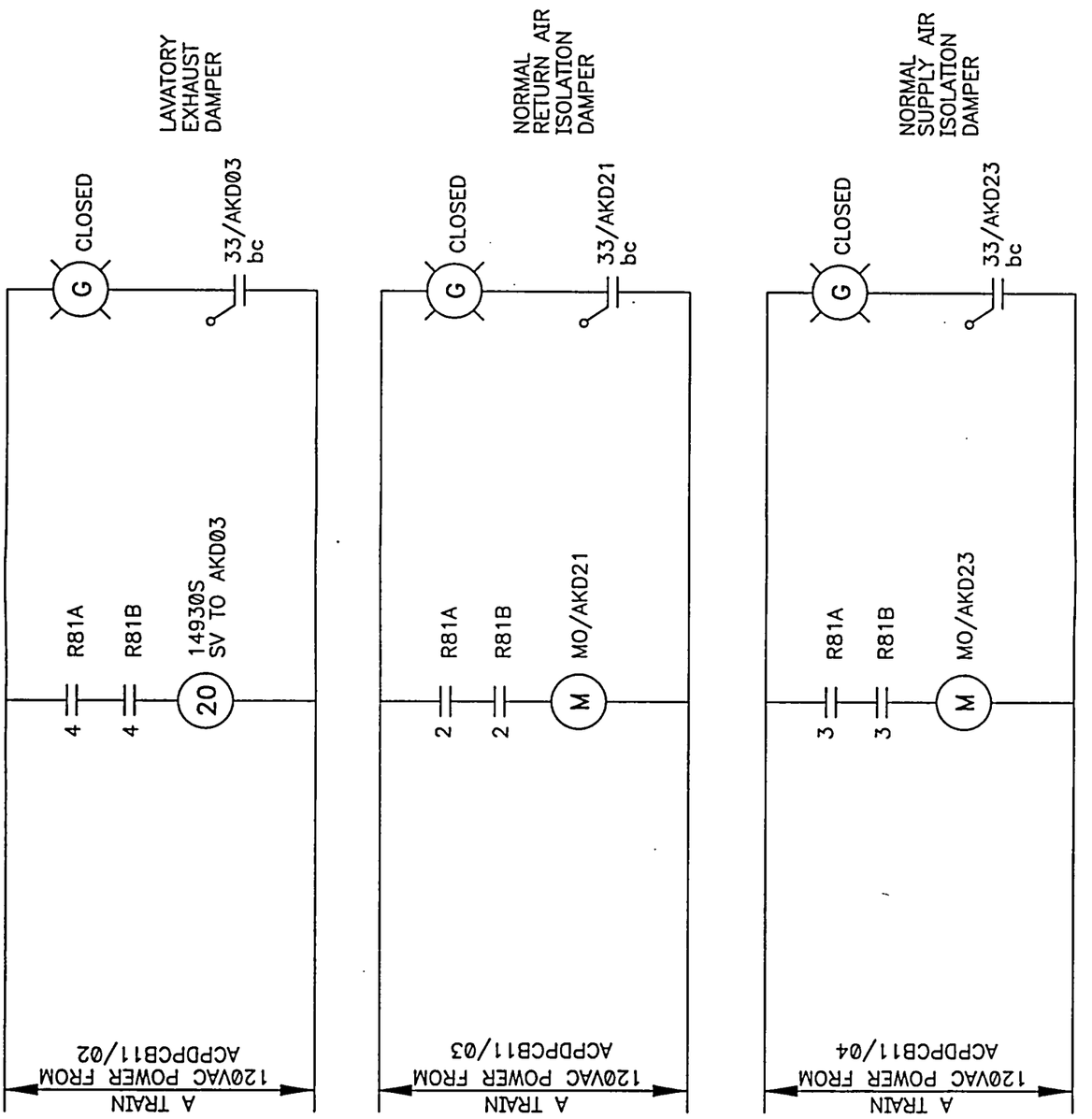
FAN B DISCHARGE DAMPER CREATS B TRAIN ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
PCR 2003-0037	SK10905-0824	2	0

NOTES:
ALL DAMPERS: POWER TO OPEN, FAIL CLOSED

DAMPER POSITION	ac	bo	ao	bc
OPEN			■	
INTERM	■	■		
CLOSED		■		■

■ N.O. CONTACTS CLOSED



ISOLATION DAMPERS:
AKD03
AKD21
AKD23

2/13/04	INFORMATION ONLY			PS	
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FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	NONE				
CAD FILENAME	SKEL0825A				

ELECTRICAL

ISOLATION DAMPERS CREATS A TRAIN ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
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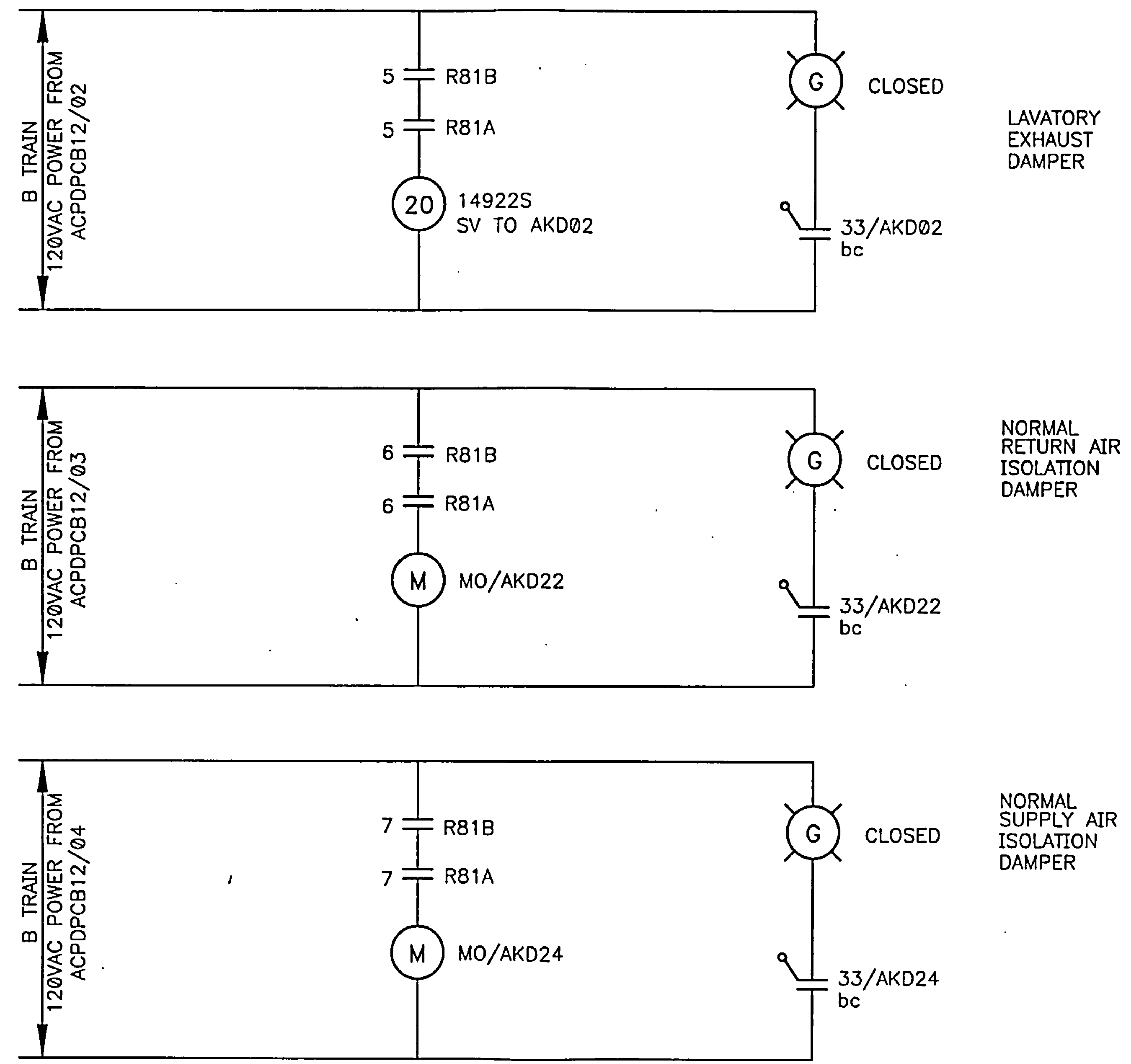

NOTES:
ALL DAMPERS: POWER TO OPEN, FAIL CLOSED

LIMIT SWITCH	DAMPER POSITION		
	CLOSED	INTERM	OPEN
ac		■	■
bo	■	■	
ao			■
bc	■		

■ N.O. CONTACTS CLOSED

ISOLATION DAMPERS: AKD02
AKD22
AKD24

REV	DATE	RELEASED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
0	2/13/04	ORIGINAL	AJV3 2/12/04	KAC 2/13/04	2/13/04	2/13/04

INFORMATION ONLY ENGINEER

REVISED FOR FACILITY GINNA
SCALE NONE
CAD FILENAME SKEL0825B

ROCHESTER GAS & ELECTRIC CORP.
ROCHESTER, NEW YORK

ELECTRICAL
ISOLATION DAMPERS
CREATS
B TRAIN
ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
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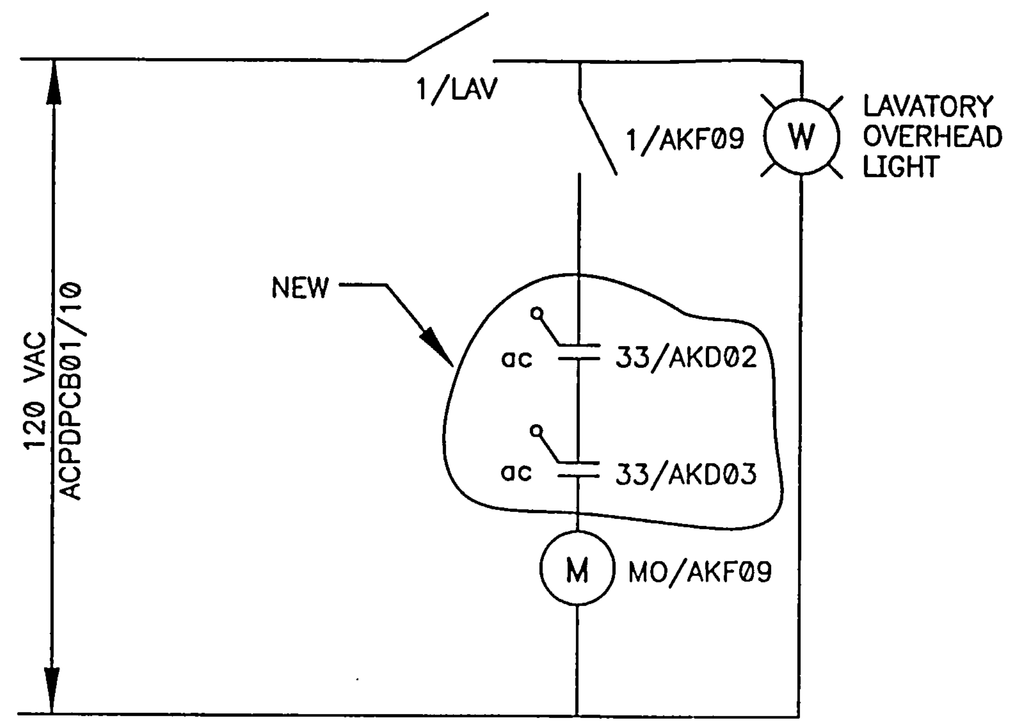

AKF09 – LAVATORY FAN
33/AKD03 – LIMIT SWITCH FOR LAVATORY EXHAUST DAMPER AKD03(A TRAIN)
33/AKD02 – LIMIT SWITCH FOR LAVATORY EXHAUST DAMPER AKD02 (B TRAIN)
1/LAV – LAVATORY LIGHT/FAN SWITCH

	DAMPER POSITION		
LIMIT SWITCH	CLOSED	INTERM	OPEN
ac		■	■
bo	■	■	
ao			■
bc	■		

■ N.O. CONTACTS CLOSED

DATE	2/13/04
RELEASED FOR	INFORMATION ONLY
ENGINEER	
REV 0	ORIGINAL
REV	REVISED FOR
FACILITY	GINNA
SCALE	NONE
CAD FILENAME	SKEL0826
DRAWN BY	AJV3 1/30/04
CHECKED BY	KAC 2/13/04
RESP ENGR	2/13/04
REVIEWER	2/13/04

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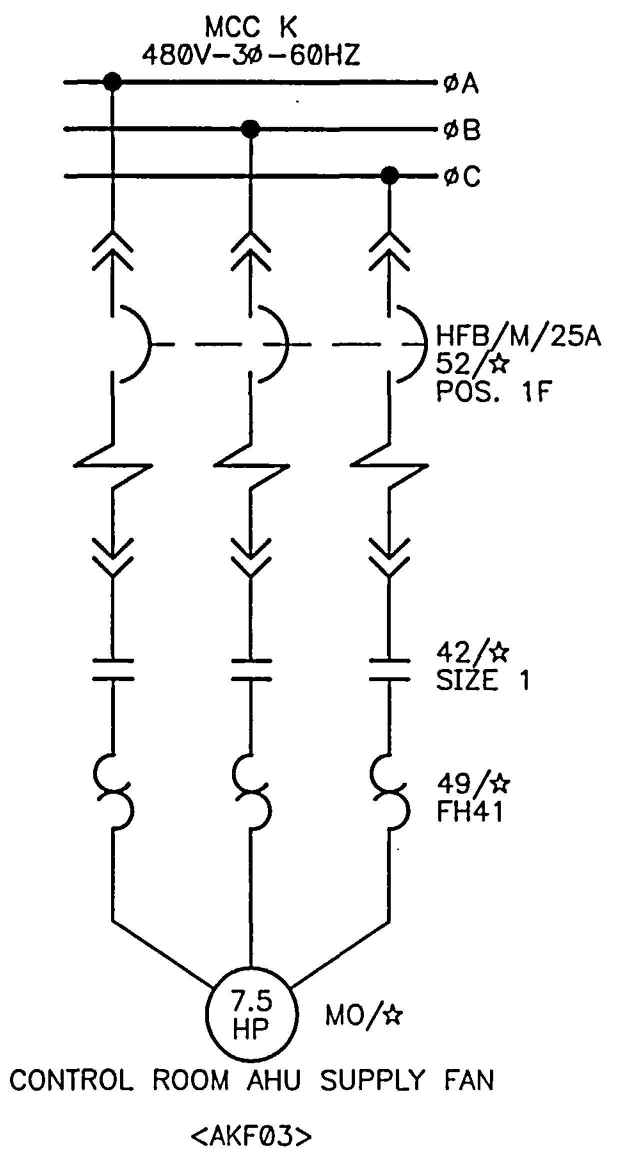
ROCHESTER, NEW YORK

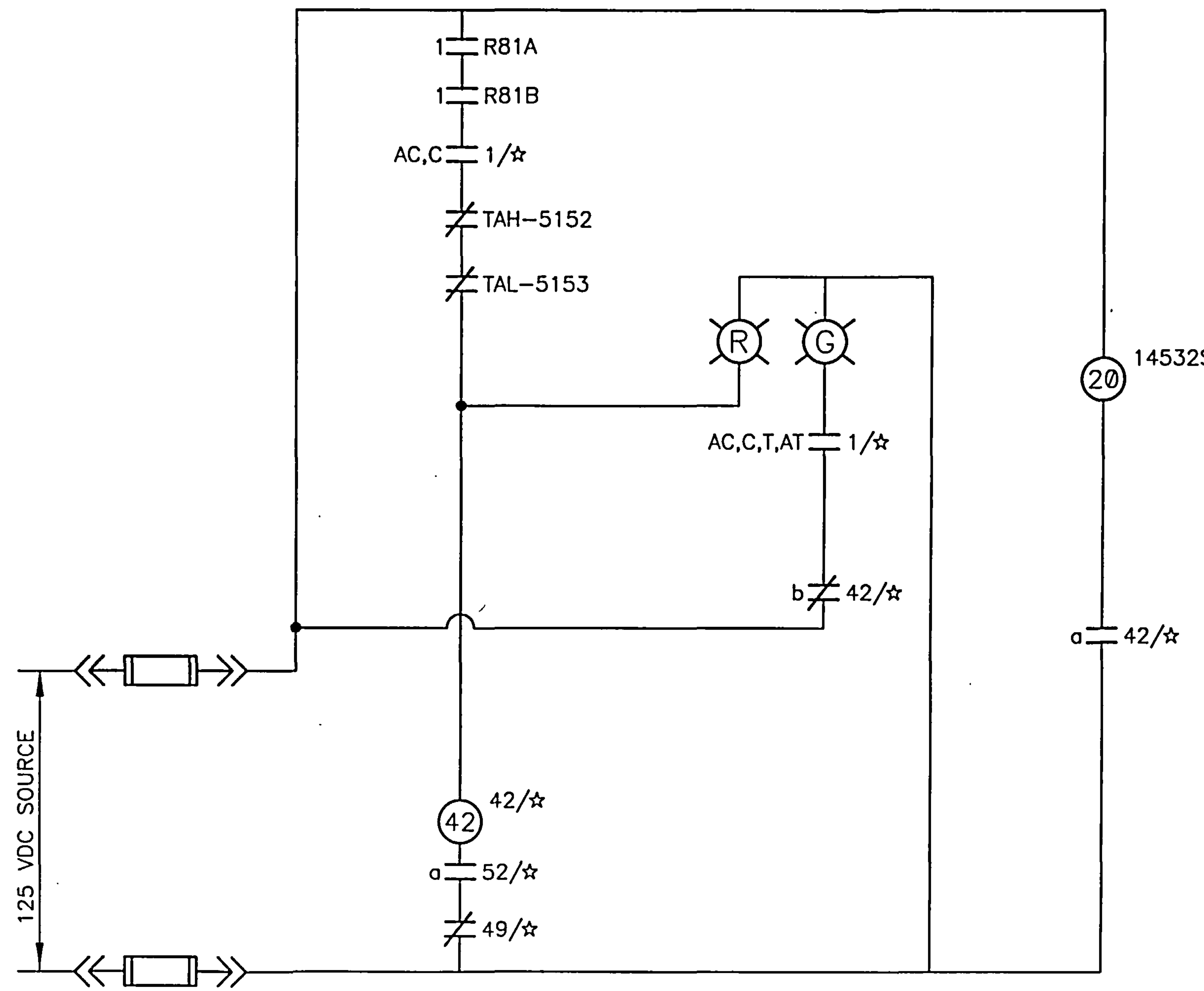
ELECTRICAL

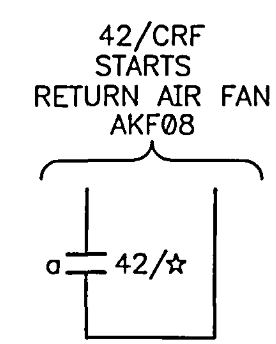
CR LAVATORY FAN CREATS

ELEMENTARY WIRING DIAGRAM

JOB NUMBER: PCR 2003-0037
DRAWING NUMBER: SK10905-0826
SHEET
REV 0







NOTES:

1) 1/☆ – SEE DEV. SH.10, FIG.1, DETAIL C.
2) TAH/TAL – FIRESTAT/FREESTAT (T81/T83) ON CRAH UNIT DUCT
3) R81A – OPENS ON HI RAD OR HI TOXIC GAS OR MANUAL CR HVAC ISOLATION. A TRAIN (SK10905-0546,1)
4) R81B – OPENS ON HI RAD OR HI TOXIC GAS OR MANUAL CR HVAC ISOLATION. B TRAIN (SK10905-0546,2)
5) 14532S – DAMPER MECHANICAL SOLENOID, OPENS AKD04 AND AKD01 AS FAN STARTS

☆=CRAH

ELECTRICAL

MCC K – POS. 1F
CONTROL ROOM AHU SUPPLY
AKF03 (42/CRAH)
ELEMENTARY WIRING DIAGRAM

JOB NUMBER	PCR 2003-0037
DRAWING NUMBER	SK10905-0196-1
SHEET	
REV	0

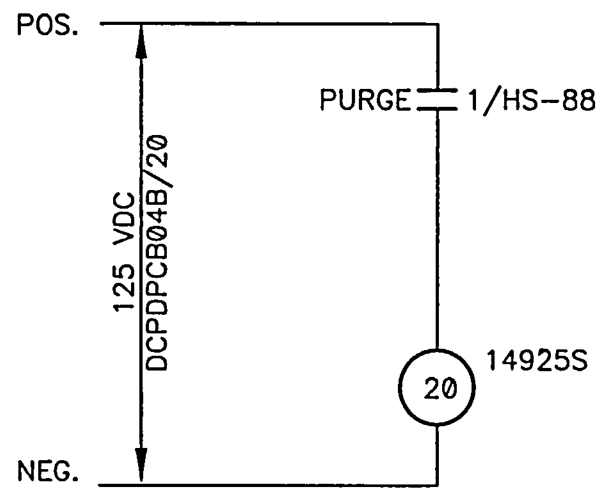
REV	DATE		ENGINEER
0	2/10/04	ORIGINAL	

INFORMATION ONLY
RELEASED FOR

FACILITY: GINNA
REVISED FOR
SCALE: NONE
CAD FILENAME: SKEL019601

DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
AJV3			
2/2/04	2/10/04	2/10/04	2/10/04

ROCHESTER GAS & ELECTRIC CORP.
ROCHESTER, NEW YORK



NOTES:

1) 1/HS-88 – HAND SWITCH "PURGE", CONTACT IS "CLOSED" IN PURGE MODE

4) 14925S – DAMPER SOLENOID, FORCE AKD01 AND AKD04 OPEN

ELECTRICAL

CONTROL ROOM VENT
PURGE MODE SELECTION

ELEMENTARY WIRING DIAGRAM

JOB NUMBER	PCR 2003-0037
DRAWING NUMBER	SK10905-0542-1
SHEET	
REV	0

INFORMATION ONLY

DATE	RELEASED FOR	ENGINEER
2/10/04		RS

REV	REVISED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
0	ORIGINAL	AJV3 2/2/04	DM 2/10/04	KC 2/10/04	RS 2/10/04

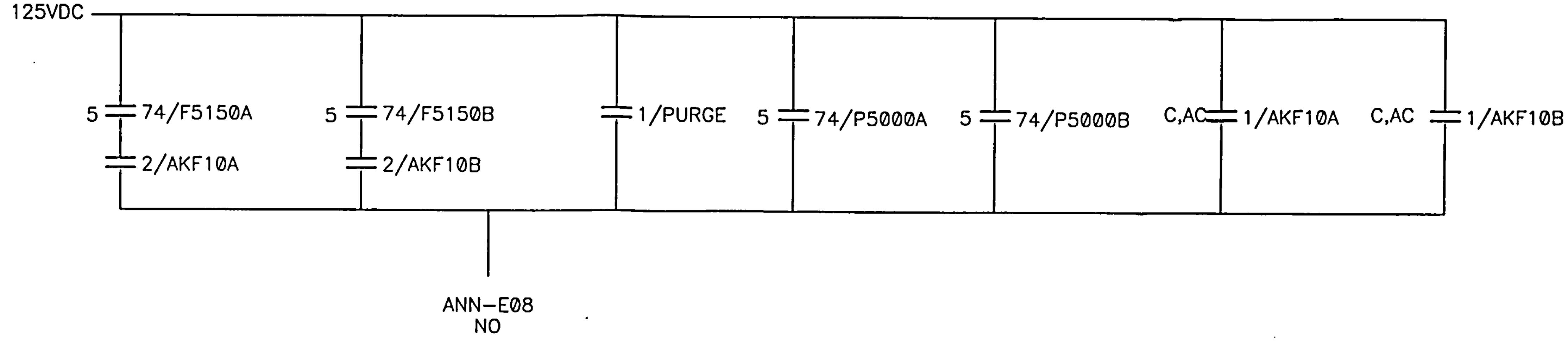
FACILITY GINNA

SCALE NONE

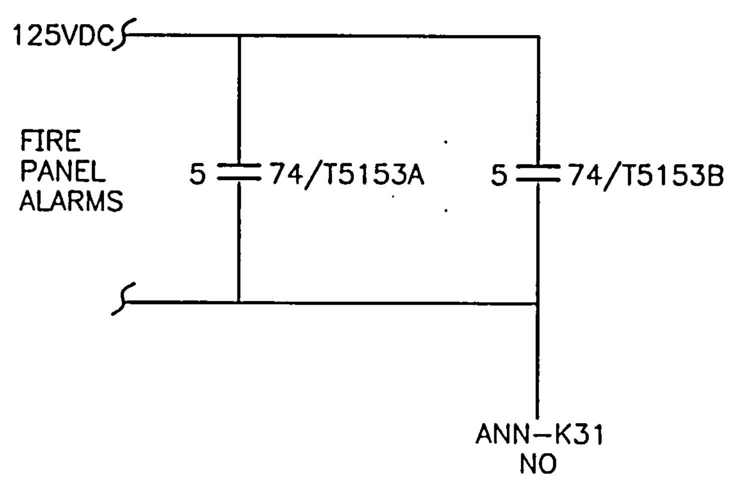
CAD FILENAME SKEL0542-1

ROCHESTER GAS & ELECTRIC CORP.
ROCHESTER, NEW YORK

ANNUNCIATOR E-8
CREATS TROUBLE



ANNUNCIATOR K-31
CREATS HIGH TEMP.



ANNUNCIATOR E08 – MOVE ANNUNCIATOR DROP TO JUMPER TERMINALS 1 AND 3, FROM 1 AND 2 TO MAKE IT A NO WINDOW

FS-5150A(B) – CLOSE ON LOW FLOW
2/AKF10A(B) – AGASTAT, CLOSES 10 SEC. AFTER FAN START
1/PURGE – CLOSE WHEN NORMAL HVAC IN PURGE MODE
74/P5000A(B) – REFRIGERANT PRESSURE

INFORMATION ONLY
RELEASED FOR | DATE 2/10/04 | ENGINEER

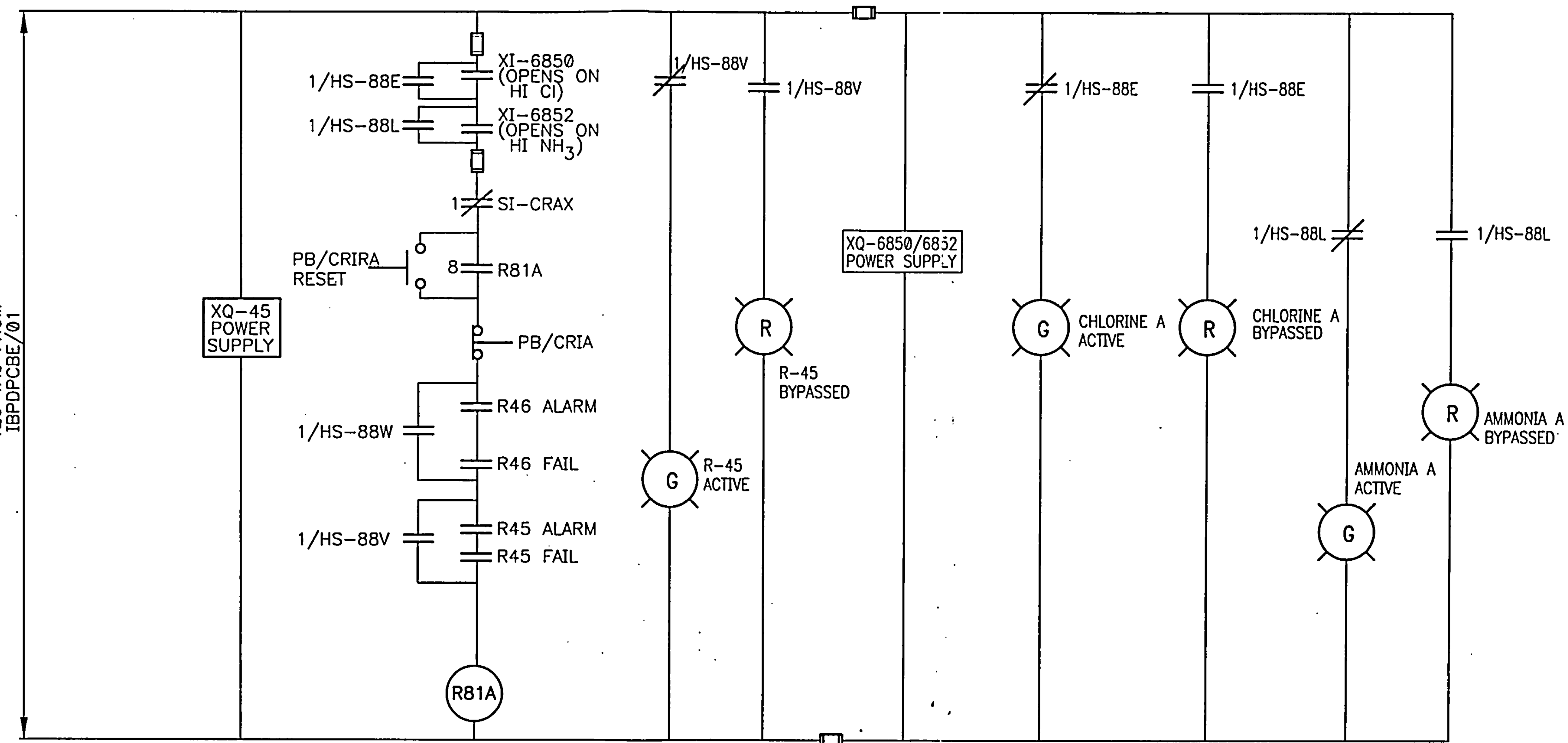
REV	REVISED FOR	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
0	ORIGINAL	AJV3 1/30/04	2/10/04	2/10/04	2/10/04

FACILITY: GINNA
SCALE: NONE
CAD FILENAME: 1G0698

ROCHESTER GAS & ELECTRIC CORP.
ROCHESTER, NEW YORK

ELECTRICAL
ANNUNCIATORS CREATS
ELEMENTARY WIRING DIAGRAM

JOB NUMBER: PCR 2003-0037
DRAWING NUMBER: 10904-0698
SHEET:
REV: 0

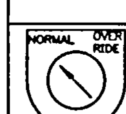


R81A – CR ISOLATION RELAY A
PB/CRIA – PB CR MANUAL ISOLATION A TRAIN
PB/CRIRA – PB CR ISOLATION RESET A
1/HS-88E – HANDSWITCH A TRAIN CHLORINE BYPASS
1/HS-88L – HANDSWITCH A TRAIN AMMONIA BYPASS
1/HS-88V – HANDSWITCH A TRAIN RADIATION BYPASS
1/HS-88W – HANDSWITCH B TRAIN RADIATION BYPASS
(CONTACTS FOR 1/HS-88E, 1/HS-88L,
1/HS-88V, 1/HS-88W ARE SHOWN IN ACTIVE OR NORMAL POSITION)
SI-CRAX – SI AUX CONTACT TRAIN A – OPENS ON SI
XQ-45 – POWER TO R-45
XQ-6850/6852 – POWER TO TOXIC GAS A

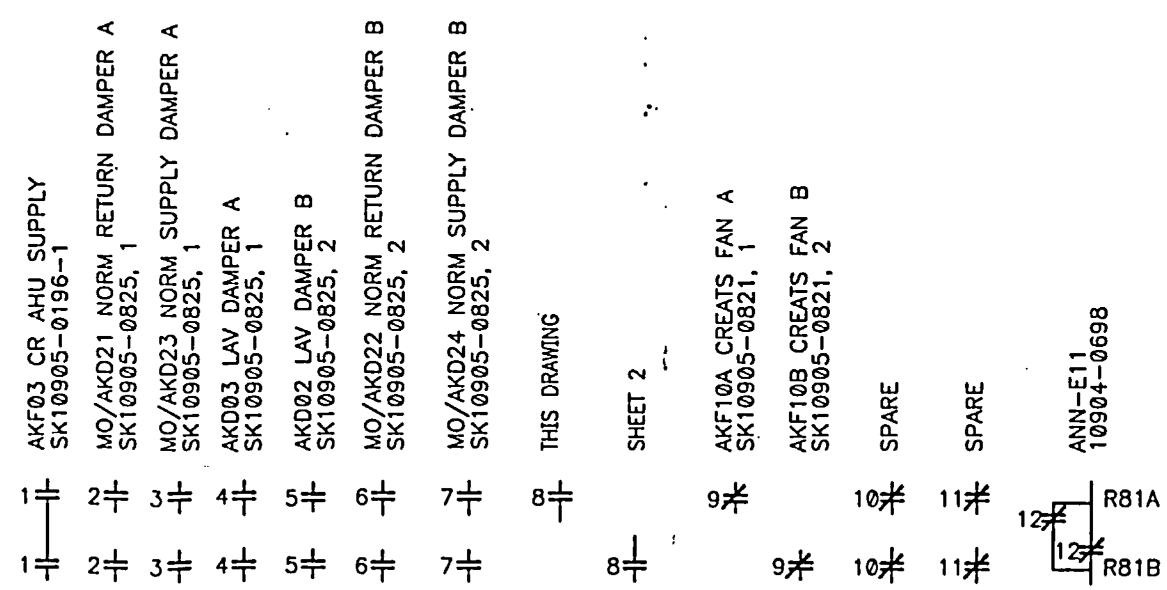
NOTES:
1. QUENCHARCS ARE INSTALLED
ACROSS COIL OF R81A

1/HS-88B

CONTACT BLOCK	CIRCUIT POSITION L	CIRCUIT POSITION R
	NO	NC



2 POSITION
MAINTAINED
KEY LOCK
SWITCH



DATE	INFORMATION ONLY
2/13/04	RELEASED FOR
	ENGINEER

REV	REVISED FOR
0	ORIGINAL

	DRAWN BY	CHECKED BY	RESP ENGR	REVIEWER
	AJV4	KAC	PS	JEP
	2/12/04	2/13/04	2/13/04	2/13/04

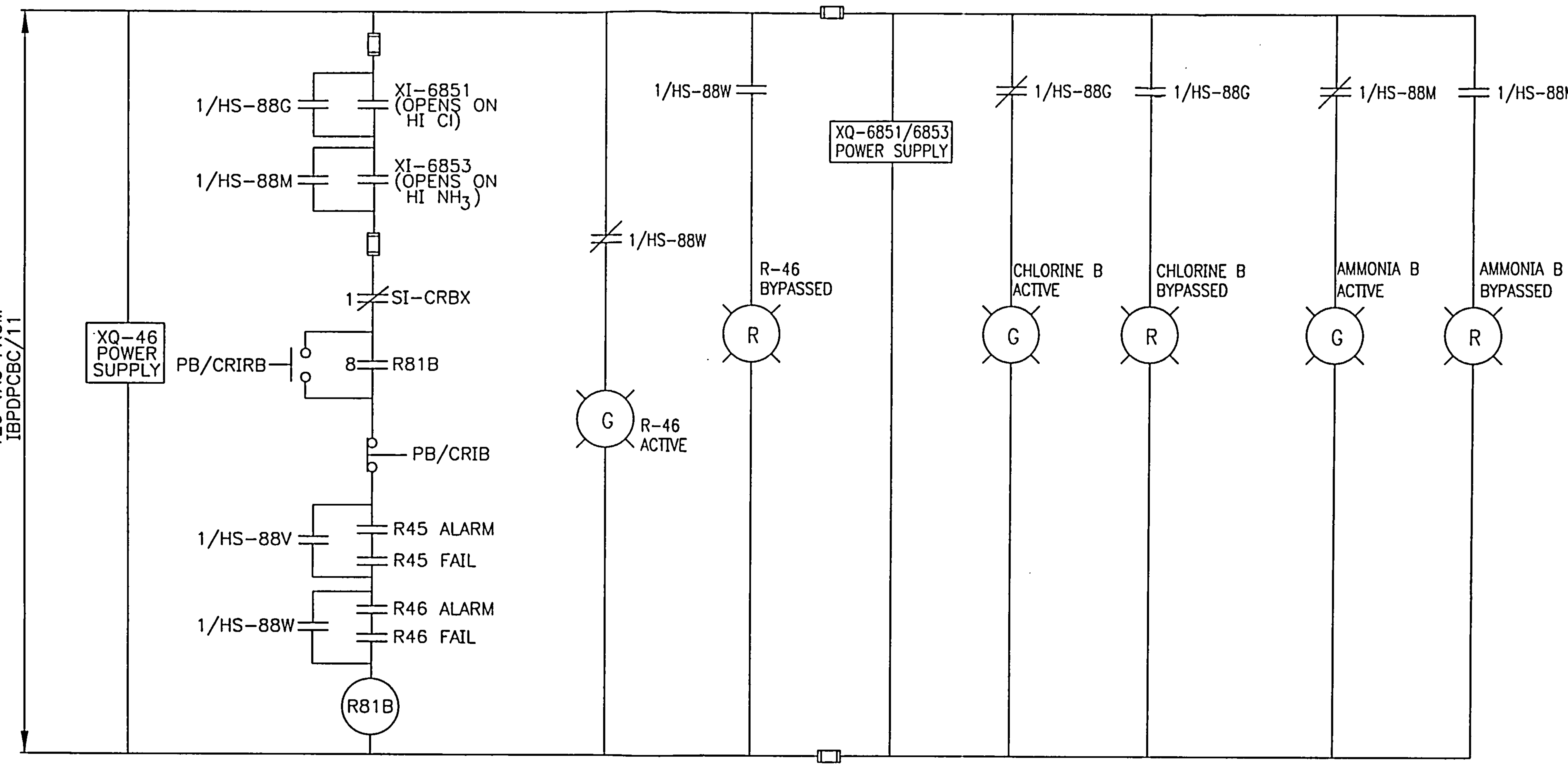
FACILITY GINNA
SCALE NONE
CAD FILENAME SKEL54601

ROCHESTER GAS & ELECTRIC CORP.
ROCHESTER, NEW YORK

ELECTRICAL

IBPDPCBE – POS 01
CONTROL ROOM HVAC ISOLATION
A TRAIN
ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
PCR 2003-0037	SK10905-0546	1	0



R81B – CR ISOLATION RELAY B
PB/CRIB – PB CR MANAUL ISOLATION B TRAIN
PB/CRIRB – PB CR ISOLATION RESET B
1/HS-88G – HANDSWITCH B TRAIN CHLORINE BYPASS
1/HS-88M – HANDSWITCH B TRAIN AMMONIA BYPASS
1/HS-88V – HANDSWITCH A TRAIN RADIATION BYPASS
1/HS-88W – HANDSWITCH B TRAIN RADIATION BYPASS
XQ-46 – POWER TO R-46
XQ-8651/6853 – POWER TO TOXIC GAS B
(CONTACTS FOR 1/HS-88G, 1/HS-88M, 1/HS-88V, 1/HS-88W
ARE SHOWN IN ACTIVE POSITION)
SEE SK21946-0546,2

NOTES:
1. QUENCHARCS ARE INSTALLED ACROSS COIL OF R81B.
2. R81B CONTACTS SHOWN ON SHEET 1.

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DATE	2/13/04
RELEASED FOR	INFORMATION ONLY
ENGINEER	PS
FACILITY	GINNA
REVISED FOR	
SCALE	NONE
CAD FILENAME	SKEL54602
DRAWN BY	AJV3 1/30/04
CHECKED BY	KAC 2/13/04
RESP ENGR	PS 2/13/04
REVIEWER	JEP 2/13/04

ROCHESTER GAS & ELECTRIC CORP.
ROCHESTER, NEW YORK

ELECTRICAL
IBPDPCBC – POS 11
CONTROL ROOM HVAC ISOLATION
B TRAIN
ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
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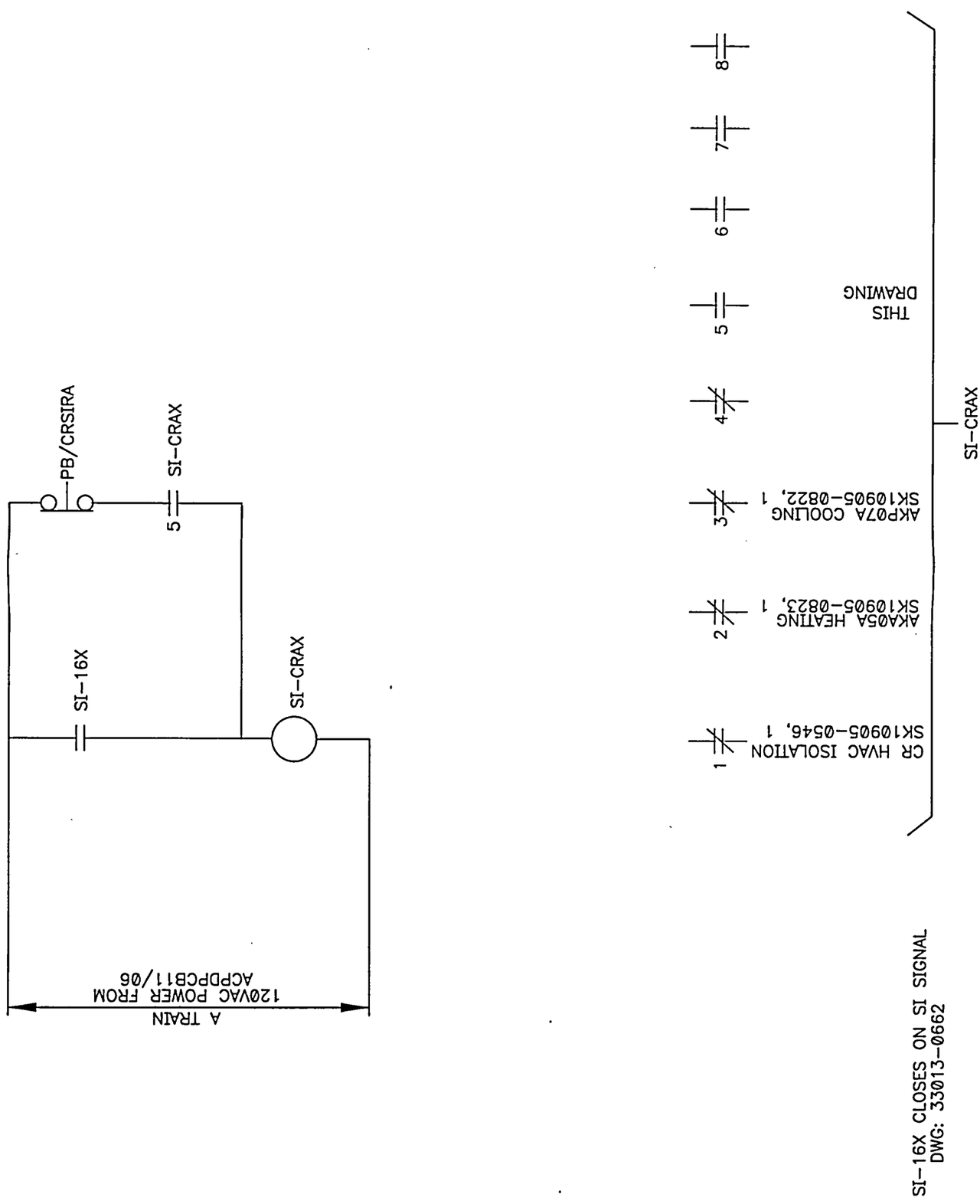

SI-16X CLOSES ON SI SIGNAL
DWG: 33013-0662

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CAD FILENAME	SKEL0819A				

ELECTRICAL

SI AUXILIARY RELAY CREATS A TRAIN ELEMENTARY WIRING DIAGRAM

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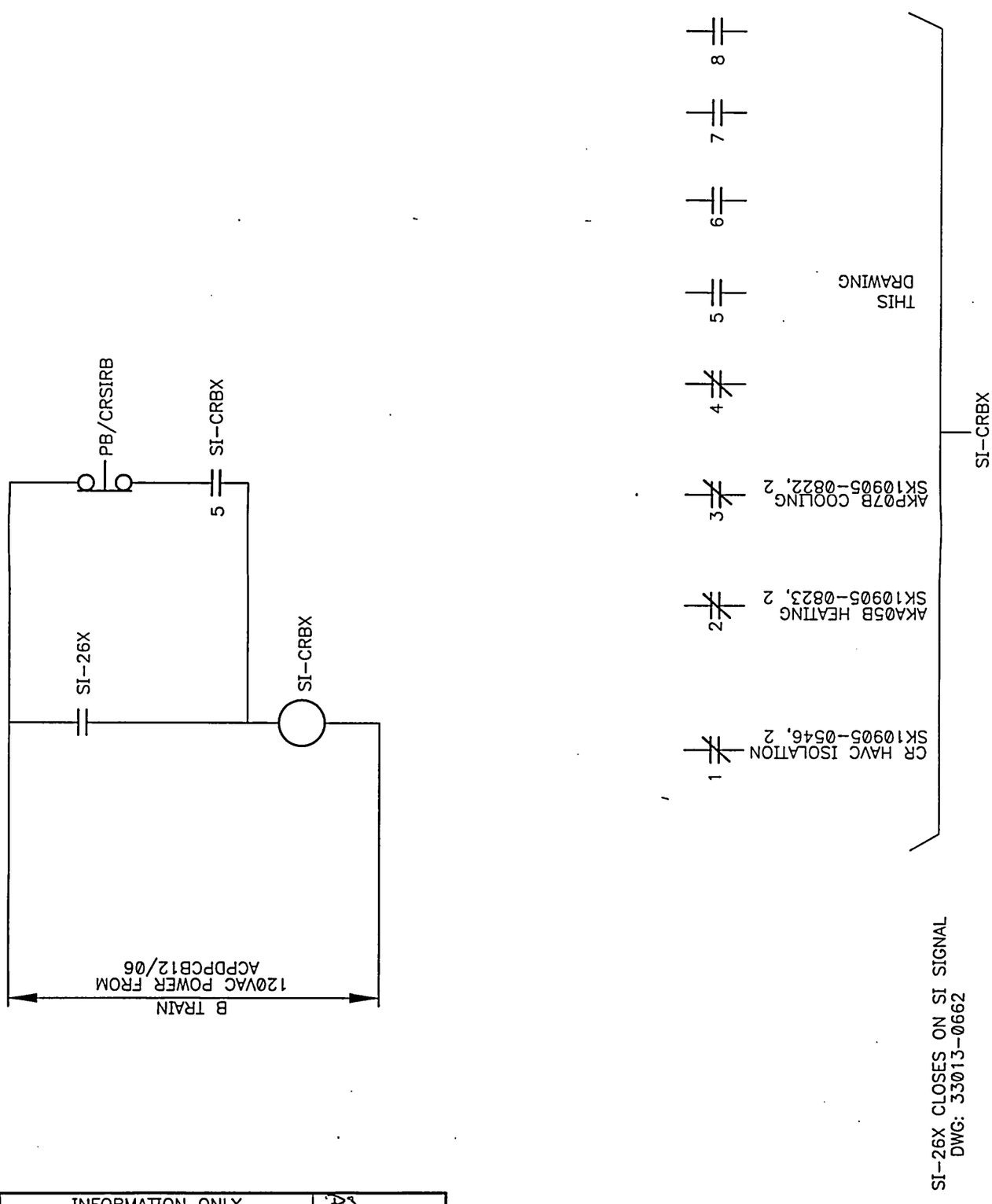

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FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	NONE				
CAD FILENAME	SKEL0819B				

ELECTRICAL

SI AUXILIARY RELAY CREATS B TRAIN ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
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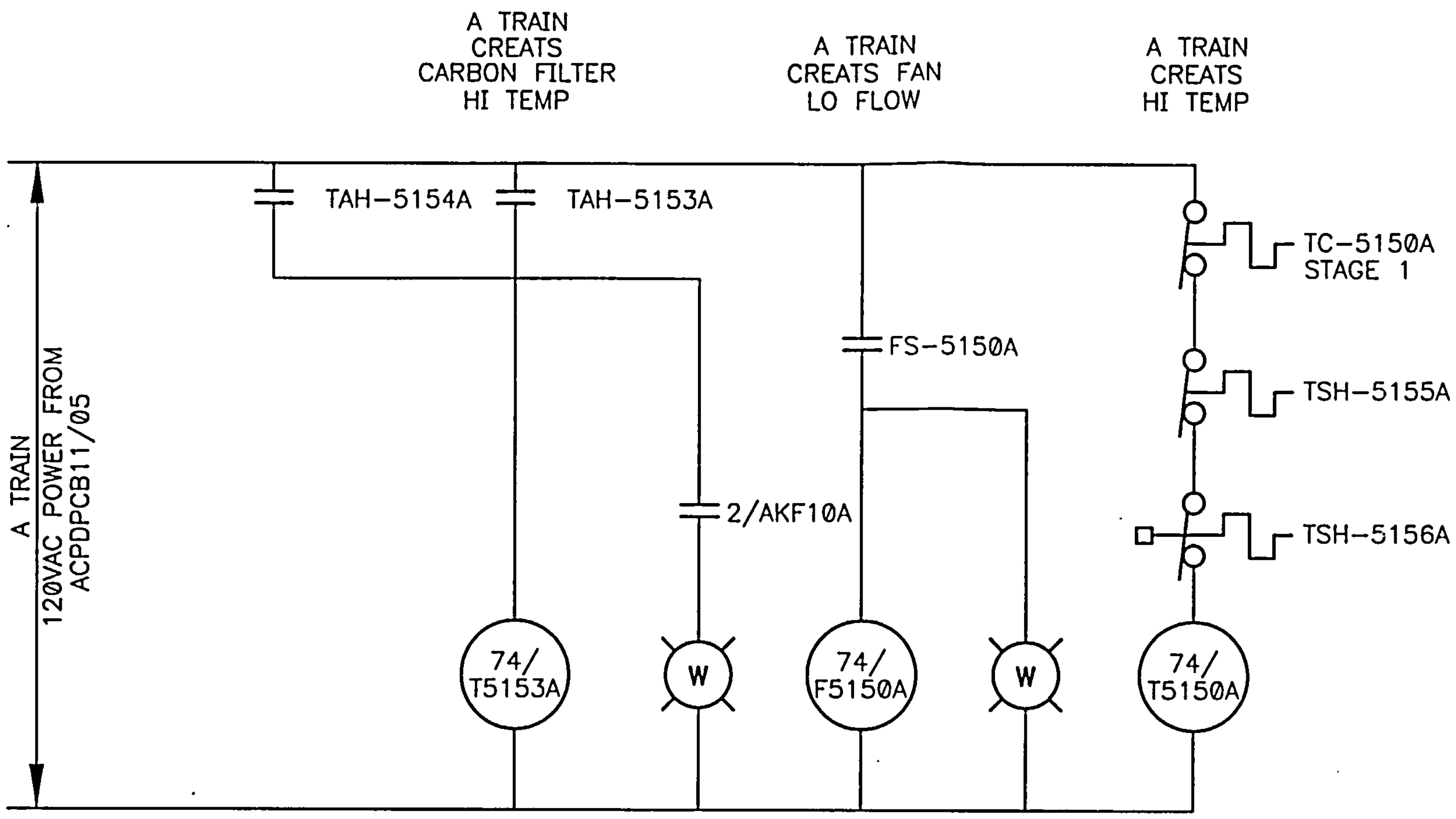
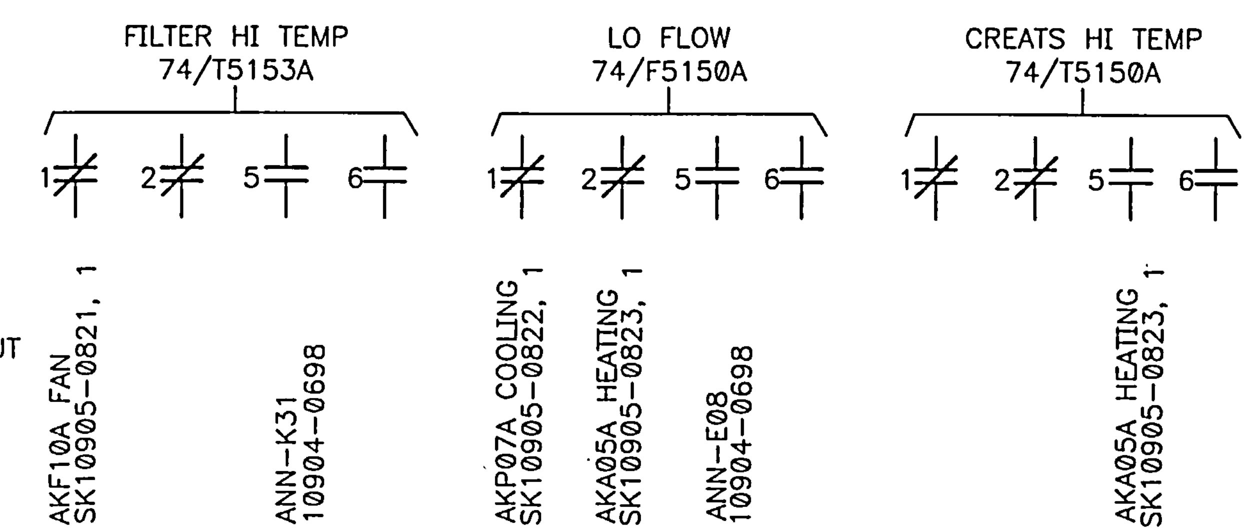


CLOSE ON HIGH TEMP — TAH-5153A DOWNSTREAM CARBON FILTER (AKL08A) HIGH TEMP
TAH-5154A UPSTREAM CARBON FILTER (AKL08A) HIGH TEMP

CLOSE ON LOW FLOW — FS-5150A CREATS FAN (AKF10A) LOW FLOW

OPEN ON HIGH TEMP — TC-5150A CONTROL ROOM THERMOSTAT A
TSH-5155A CREATS A HEAT (AKA05A) AUTOMATIC RESET THERMAL CUTOUT
TSH-5156A CREATS A HEAT (AKA05A) MANUAL RESET THERMAL CUTOUT

2/AKF10A – SEE SK10905-0821, 1



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REVISED FOR	
FACILITY	GINNA
SCALE	NONE
CAD FILENAME	SKEL0820A
DRAWN BY	AJV3 2/12/04
CHECKED BY	KAC 2/13/04
RESP ENGR	PS 2/13/04
REVIEWER	JEP 2/13/04

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ROCHESTER, NEW YORK

ELECTRICAL

MISCELLANEOUS AUX. RELAYS CREATS A TRAIN
ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
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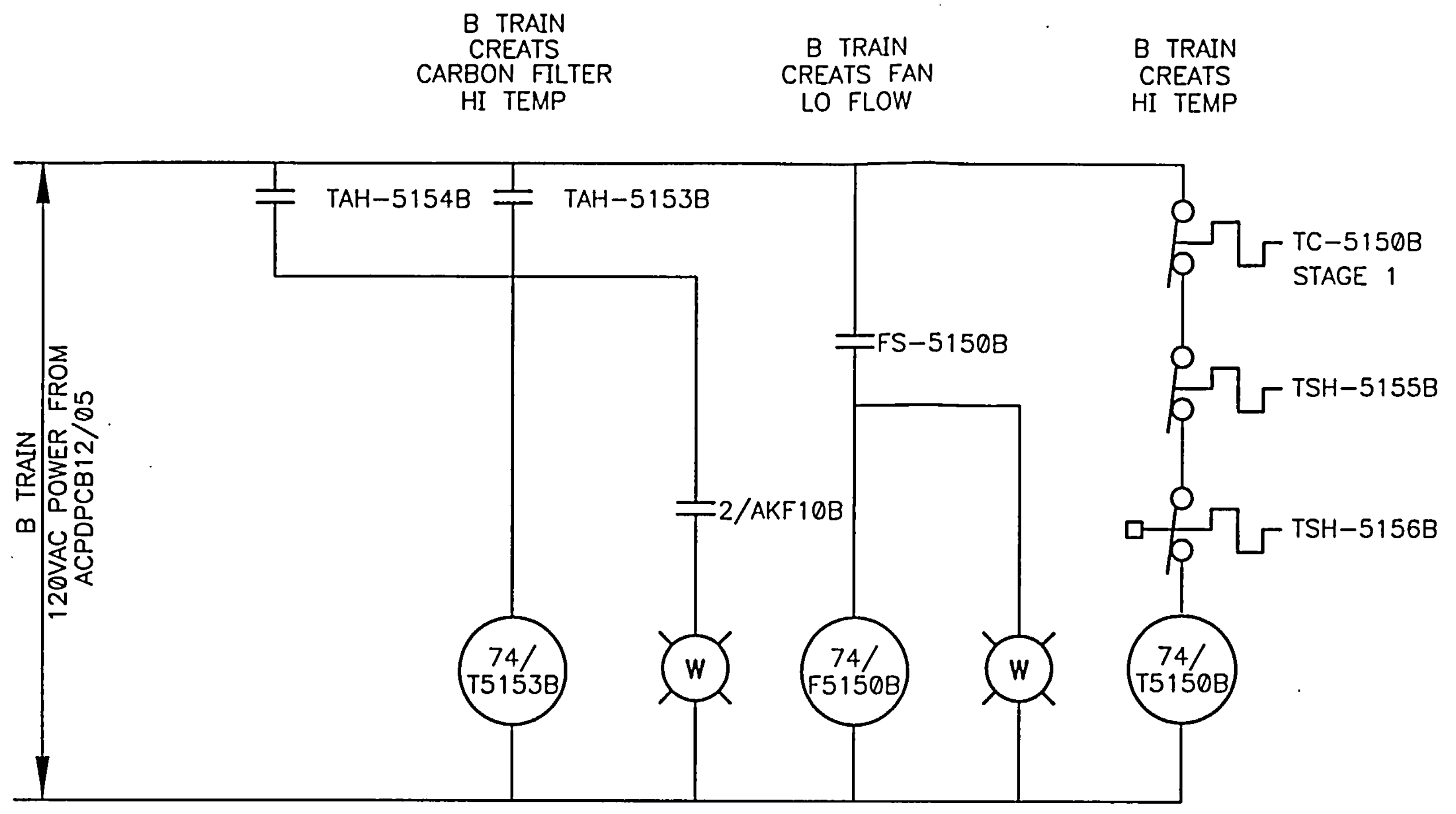
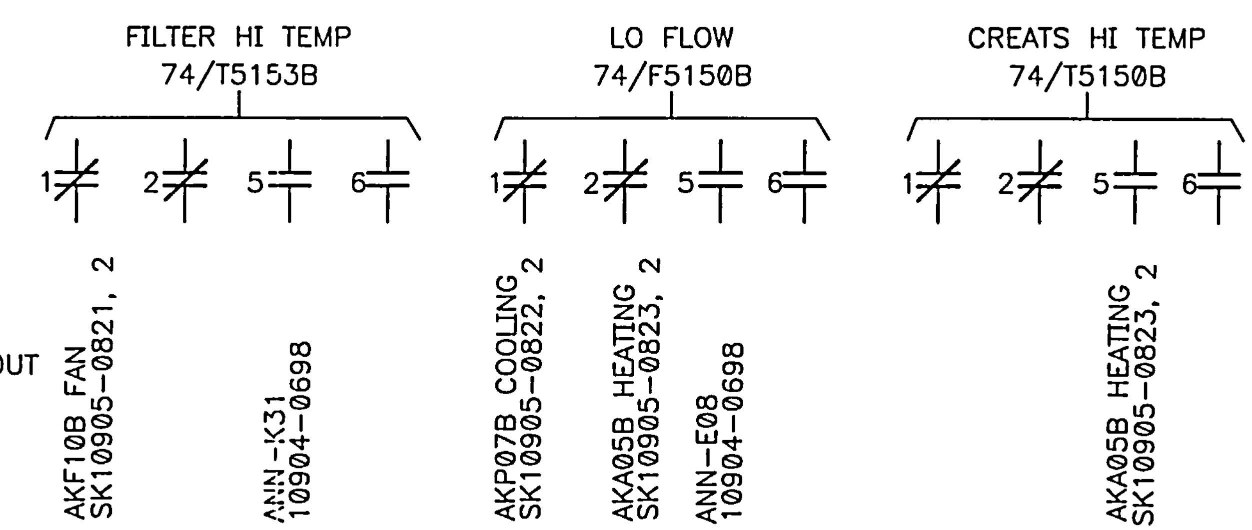


CLOSE ON HIGH TEMP — TAH-5153B DOWNSTREAM CARBON FILTER (AKL08B) HIGH TEMP
TAH-5154B UPSTREAM CARBON FILTER (AKL08B) HIGH TEMP

CLOSE ON LOW FLOW — FS-5150B CREATS FAN (AKF10B) LOW FLOW

OPEN ON HIGH TEMP — TC-5150B CONTROL ROOM THERMOSTAT B
TSH-5155B CREATS B HEAT (AKA05B) AUTOMATIC RESET THERMAL CUTOUT
TSH-5156B CREATS B HEAT (AKA05B) MANUAL RESET THERMAL CUTOUT

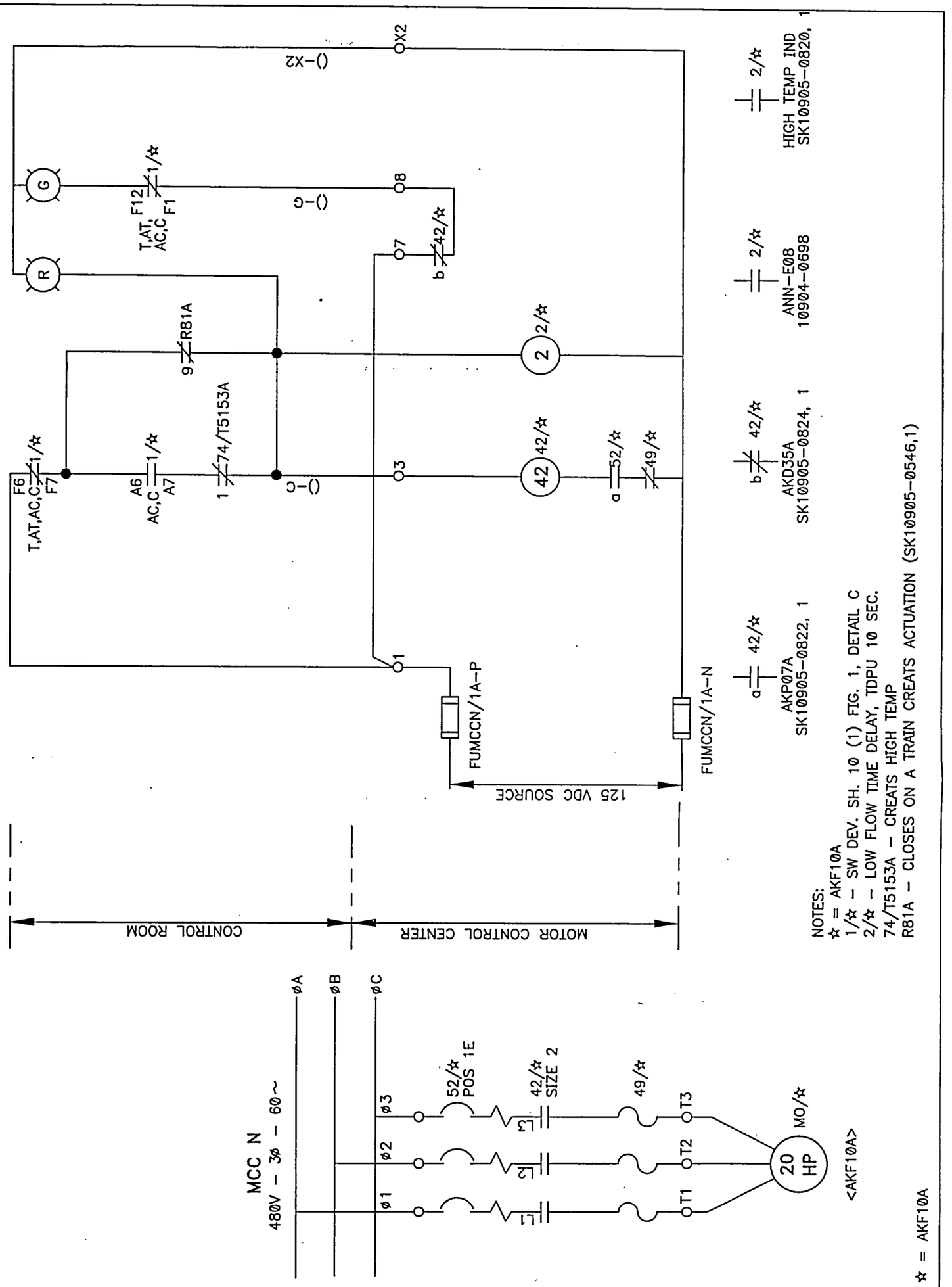
2/AKF10B - SEE SK10905-0821, 2



2/13/04 DATE — INFORMATION ONLY — RELEASED FOR — ENGINEER
REV 0 — ORIGINAL
FACILITY: GINNA — REVISED FOR
SCALE: NONE
CAD FILENAME: SKEL0820B
AJV3 — DRAWN BY 2/12/04; CHECKED BY 2/13/04; RESP ENGR 2/13/04; REVIEWER 2/13/04
ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK

ELEMENTARY WIRING DIAGRAM
MISCELLANEOUS AUX. RELAYS CREATS B TRAIN
ELECTRICAL

JOB NUMBER	DRAWING NUMBER	SHEET	REV
PCR 2003-0037	SK10905-0820	2	0



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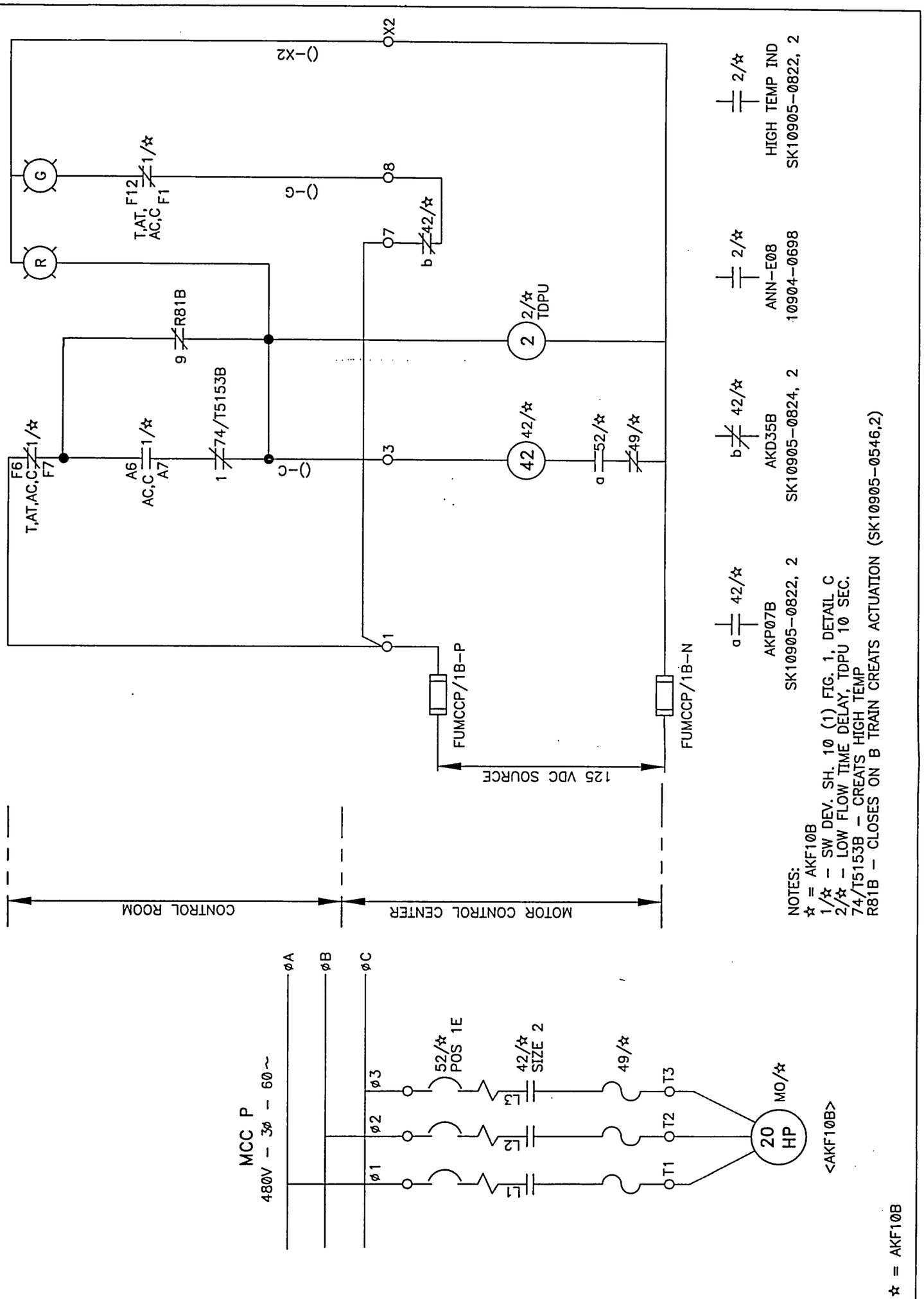
FACILITY	GINNA	ROCHESTER GAS & ELECTRIC CORP. ROCHESTER, NEW YORK			
SCALE	NONE				
CAD FILENAME	SKEL0821A				

ELECTRICAL

MCCN - POS. 1E
CREATS FAN A <AKF10A>
ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
PCR 2003-0037	SK10905-0821	1	0



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FACILITY	GINNA				
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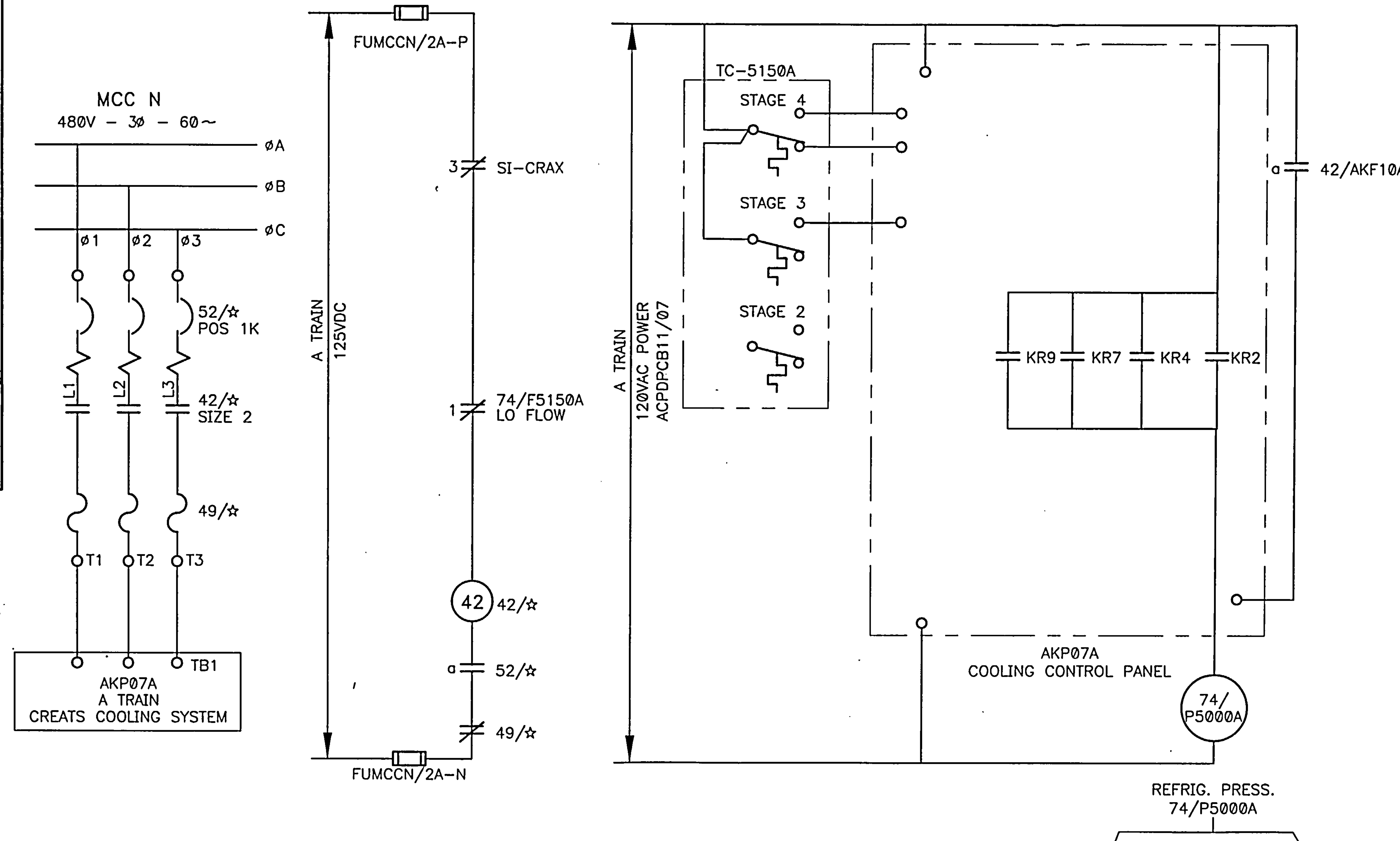
CAD FILENAME	SKEL0821B				

ELECTRICAL

MCCP - POS. 1E CREATS FAN B <AKF10B>

ELEMENTARY WIRING DIAGRAM

JOB NUMBER	DRAWING NUMBER	SHEET	REV
PCR 2003-0037	SK10905-0821	2	0



42/AKF10A – CREATS FAN A
SI-CRAX – AUXILIARY SI CONTACT – OPEN ON SI
74/F5150A – OPENS ON LO FLOW

CLOSE WHEN STPT EXCEEDED – KR2, KR7 CREATS A REFRIGERANT LOW PRESSURE
KR4, KR9 CREATS A REFRIGERANT HIGH PRESSURE

☆AKP07A

REV	REVISED FOR	DATE
0	ORIGINAL	2/13/04

INFORMATION ONLY — RELEASED FOR — ENGINEER: PS

FACILITY: GINNA
SCALE: NONE
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	2/2/04	2/13/04	2/13/04	2/13/04

ROCHESTER GAS & ELECTRIC CORP.
ROCHESTER, NEW YORK

ELECTRICAL

MCC N POS. 1K
CREATS COOLING UNIT A
<AKP07A>

ELEMENTARY WIRING DIAGRAM

JOB NUMBER: PCR 2003-0037
DRAWING NUMBER: SK10905-0822
SHEET: 1
REV: 0

Attachment 2
Justification of Locked Rotor Failed Fuel Assumption

LOCKED ROTOR FUEL FAILURE EVALUATION

BACKGROUND

The Westinghouse accident analyse for the locked rotor event, assumes that fuel failure occurs at the onset of DNB, even though the rods may be in a film boiling condition for a very short period of time. In fact, for rods going into DNB for a short duration, fuel failure may not occur. Also, alternative methods of evaluation, such as utilizing the fuel rod enthalpy as a measure of fuel failure, would reduce the conservatism inherent in the use of the DNB or Critical Power Ratio methods.

The application of the Westinghouse locked rotor DNB analysis, to a 2-loop plant, tends to result in high fuel failure, e.g., >70%. A review of non-Westinghouse locked rotor analyses, for other 2-loop plants (Kewaunee and Prairie Island) found that relatively small amounts of fuel failure are predicted.

Rather than base Ginna's locked rotor dose analysis on the results of a conventional DNB-based fuel failure analysis, Ginna's assumed percent failed fuel will be conservatively based on the failed fuel results of other similar plants.

The factors that may lead to DNB (fuel failure), following a locked rotor, event include:

- reduced reactor coolant flow rate
- increased power production in fuel

The following data describes the reduction in core cooling as a result of a locked rotor, the overall NSSS power and the distribution of power within the core.

- Only 2-loop NSSS - The selection of only 2-loop plants provides data that reflects a loss of 50% of the total reactor coolant flow.

- NSSS Power - The power produced by the plant. Increased fuel power density may result in failed fuel following a locked rotor event.

- F_Q limit - The hot channel factor is the ratio of the maximum rod linear power density to the average linear power density. Higher powered rods are more likely to fail following a reduction in reactor coolant flow.

- $F\Delta H$ limit - The radial peaking factor is the ratio of power produced by the highest powered (fresh fuel) rod to the average rod. Higher powered rods are more likely to fail following a reduction in reactor coolant flow.

DATA

The data, in Table 1, was obtained by searching publically available documents, through the NRC's ADAMS document system. All 2-loop Westinghouse NSSS plants (Ginna, Point Beach, Prairie Island and Kewaunee) were searched. Search terms included : Reload Safety Evaluation, RSE, locked rotor, COLR, NDR, Nuclear Design Report, and failed fuel.

Inspection of the data shows the following:

- Power Level - The plants have similar power levels (Kewaunee and Prairie Island produce 8.5% more power than Ginna).
- FΔH - The FΔH limit assumed by Kewaunee is constant. As such there is no observable trend with respect to failed fuel. Ginna's FΔH limit is in the middle of the range: about 3% higher than Kewaunee and about 1% less than Point Beach.
- Fq - The Fq limit assumed by Kewaunee shows a decreasing trend. Ginna's Fq limit is outside the range: about 9% higher than the Kewaunee Cycle 25 value and about 2% higher than Point Beach's.

RESULTS

Two-loop core power parameters were compared. The results of the comparison shown that the Ginna data is bounded by some of the values and exceeds others. However, in all cases, the values are comparable. The percent failed fuel ranges from 40 percent (Kewaunee Cy 23), to 15.5 percent (Point Beach Cy 21).

The Kewaunee data shows a trend of decreasing failed fuel (40% for Cy 23, 19.3% for Cy 25).

GINNA FAILED FUEL ASSUMPTION

The most conservative application of this failed fuel data is to use the highest observed value. In addition, margin is added for additional conservatism. The percent failed fuel proposed for the Ginna locked rotor dose analysis is 50%. This is based on the highest reported value of 40% (Kewaunee Cycle 23) with an arbitrary 25% conservatism added.

Table 1 - Core Parameters for Locked Rotor Failed Fuel Evaluation

Parameter	Ginna Cy 30	Sensi -tivity	Kewaunee Cy 25	Kewaunee Cy 24	Kewaunee Cy 23	Prairie Island Cy 21
Power, Mwt	1520	≤	1650	1650	1650	1650
F_Q Limit	2.45	≤	2.25	2.35	2.35	2.40
$F_\Delta H$ Limit	1.75	≤	1.70	1.70	1.70	1.77
Percent Pins with ≥ limiting $F_\Delta H$ (failed fuel)	50 (assumed)	≥	19.3	20.7	40.0	15.5